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DOE Contract No. DE-AC05-98OR22700  
Job No. 23900  
August 22, 2001

Mr. W. Don Seaborg  
Paducah Site Manager  
U.S. Department of Energy  
P.O. Box 1410  
Paducah, KY 42002-1410

Subject: C-746-S&T Landfills Remedial Investigation Scoping Package

Dear Mr. Seaborg:

Enclosed is the data package for scoping the remedial investigation for the C-746-S&T Landfills. Electronic files of this data package are located on a file transfer protocol website located at <ftp://epa@www.saiceecg.com/FTP/private/DataScoping/>. Please follow the following steps to view the electronic files: 1) access the website, 2) type in the password "readdata," 3) open Paducah Gaseous Diffusion Plant Core Team Folder, 4) open the miscellaneous folder, 5) open the C-746-S&T Folder, and 6) open each of the three files.

This information has been provided to the Project Performance Corporation for distribution to the Groundwater Operable Unit (GWOU) Core Team. A review of this document and scoping the remedial investigation of the C-746-S&T Landfills is scheduled for the September GWOU Core Team meeting.

It is a pleasure assisting you with this project. If you have any questions or need additional information, please contact Mark Gage of my staff at 5125.

Sincerely,

A handwritten signature in black ink, appearing to read "Gordon L. Dover".

Gordon L. Dover  
Paducah Manager of Projects

GLD:ll  
LTR-PAD/EP-LL-01-0089

Enclosure: Subject document

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I-02823-0090

## **C-746-S&T LANDFILLS REMEDIAL INVESTIGATION SCOPING PACKAGE**

This package presents the preliminary scope of an upcoming remedial investigation (RI) to be performed at the C-746-S&T Landfills and contiguous areas to the east, south, and west. These landfills are located north of the Paducah Gaseous Diffusion Plant (PGDP) and Ogden Landing Road. The RI area is shown on **Fig. 1**. This RI scope includes the following (**Fig. 2**):

- Solid Waste Management Units (SWMUs) 9 and 10 - the C-746-S&T Landfills;
- SWMUs 17 and 18 - the C-616-E and -F Lagoons;
- a portion of SWMU 58 - the North-South Diversion Ditch (NSDD) outside the PGDP security area;
- the buried reach of the former NSDD;
- Area of Concern (AOC) 111 (A, B, and C) - Concrete Rubble Piles 9A, 9B, and 9C;
- SWMU 145 - the construction/demolition debris disposal and spoils area;
- portions of SWMU 201 - the Northwest Plume; and
- portions of SWMU 202 - the Northeast Plume.

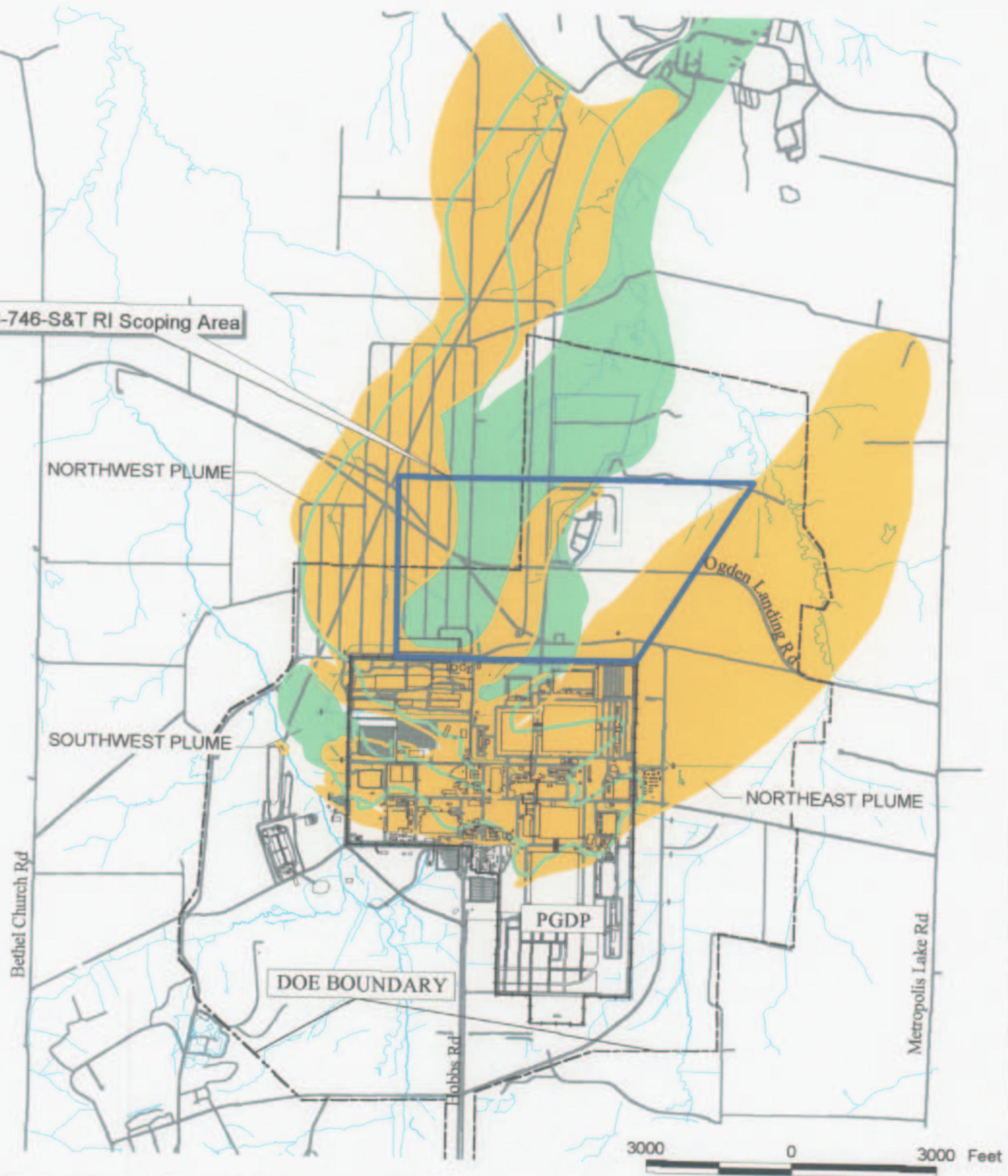
The objective of this package is to support step 1 of the Data Quality Objective (DQO) process and provide historical information for the upcoming RI scoping effort. This package presents the following:

- the site history of each of the SWMUs included in this RI scope;
- a conceptual model for the investigation area, including geology/hydrogeology, contaminant sources, contaminants of concern, and release and exposure pathways; and
- the DQO process.

### **SITE HISTORY**

The C-746-S&T RI focuses on the impact of the following SWMUs on area groundwater quality:

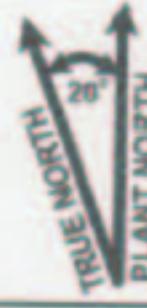
- SWMU 9: C-746-S Residential Landfill,  
SWMU 10: C-746-T Inert (Old Construction) Landfill,  
SWMU 58: NSDD (outside plant security area), and  
SWMU 145: Construction/Demolition Debris Disposal and Spoils Area.



LEGEND:

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S-T RI SCOPING AREA  
 2000 TCE PLUME BOUNDARY  
 2000 Tc-99 PLUME BOUNDARY



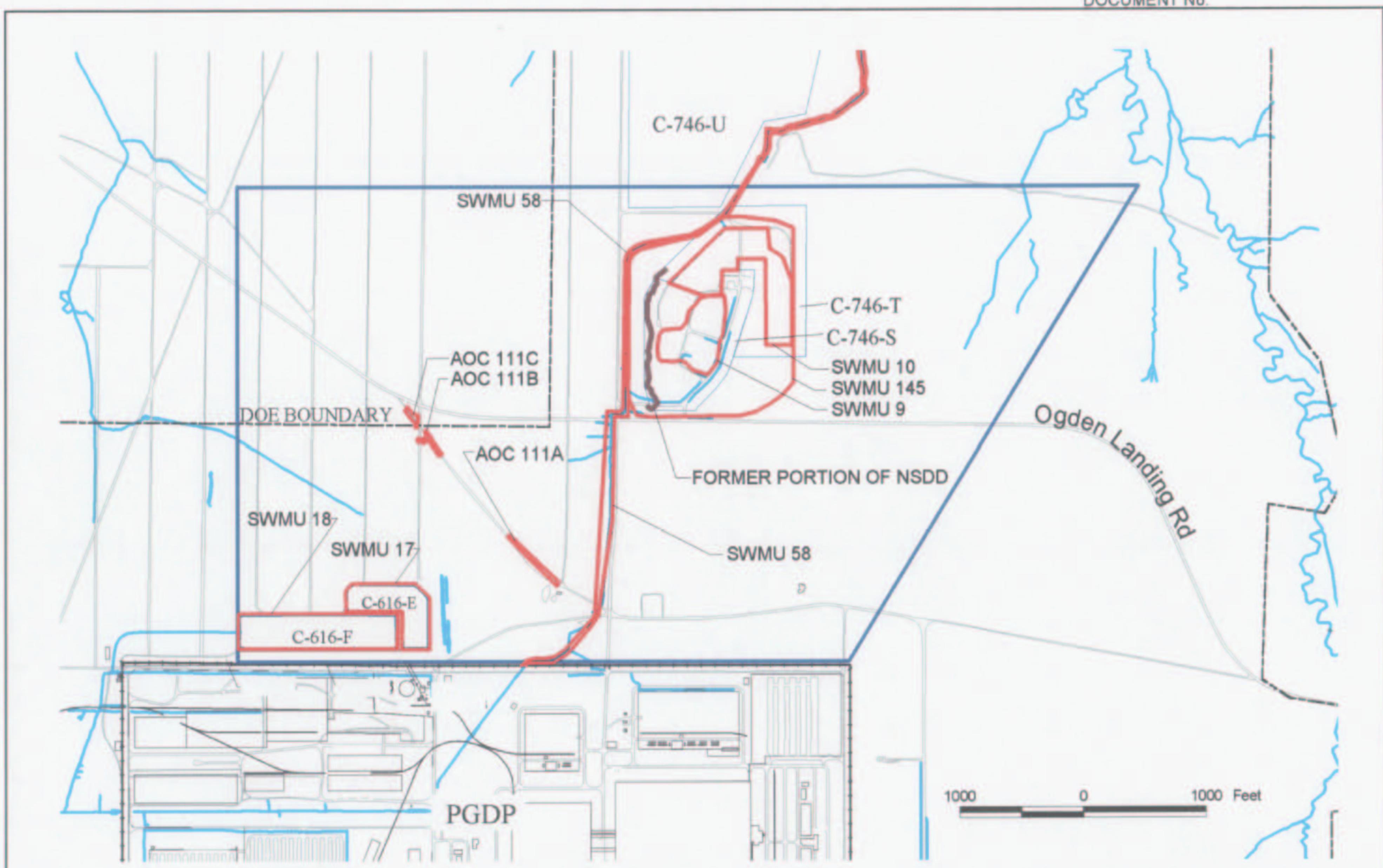
**U.S. DEPARTMENT OF ENERGY**  
 DOE OAK RIDGE OPERATIONS  
 PADUCAH GASEOUS DIFFUSION PLANT

**BECHTEL JACOBS COMPANY LLC**  
MANAGED FOR THE U.S. DEPARTMENT OF ENERGY UNDER  
U.S. GOVERNMENT CONTRACT DE-AC-05-98OR22700  
Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio



*Science Applications  
International Corporation*  
P.O. Box 2502  
Oak Ridge, Tennessee 37831

Fig. 1. C-746-S&T RI scoping area.



**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

**C-746-S&T RI SCOPING AREA**  
**SWMU BOUNDARY**  
**BURIED REACH OF THE FORMER NSDD**

NOTE: SWMUs 201 and 202 are the Northwest and Northeast Plumes, respectively. Their locations are shown in Figure 1.



#### U.S. DEPARTMENT OF ENERGY

DOE OAK RIDGE OPERATIONS  
PADUCAH GASEOUS DIFFUSION PLANT

**BECHTEL JACOBS COMPANY LLC**  
Former Jacobs Company LLC

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US GOVERNMENT CONTRACT DE-AC-05-OR22700  
Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio



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Fig. 2. SWMUs within C-746-S&T RI scoping area.

A significant area is included within the scope of this remedial investigation to assess the impact of upgradient dissolved contamination that may be flowing through the C-746-S&T area. Additional SWMUs that are present in the study area include the following:

- SWMU 17: C-616-E Sludge Lagoon,
- SWMU 18: C-616-F Full Flow Lagoon,
- AOC 111: Concrete Rubble Pile 9,
- SWMU 201: Northwest Plume, and
- SWMU 202: Northeast Plume.

#### **SWMUs 9 and 10: C-746-S Residential Landfill and C-746-T Inert Landfill**

The beginning of use of the C-746-S&T Landfills complex remains undocumented. However, anecdotal evidence and historical aerial photographs are sufficient to show that the area (known as the McGraw and Subcontractor Discard Area) was used for the disposal of site-related construction debris since the construction period of the plant (circa 1952). By 1973, the disposal area consisted of approximately 9.3 hectares (23 acres)/93,000 m<sup>2</sup> (1 million ft<sup>2</sup>) (Union Carbide 1973).

A preliminary design for the construction of the C-746-S&T complex was completed in the late 1970s (DOE 1993). Prior to the summer of 1980, the U.S. Department of Energy (DOE) retained Rust Engineering Company to design a sanitary landfill to handle normal “municipal refuse.” Rust Engineering Company subcontracted Geraghty and Miller, Inc., to perform a hydrogeologic study of the proposed sanitary landfill site. In August 1980, Wehran Engineering submitted a hydrogeologic assessment of proposed sanitary landfill (field evaluation on June 18 and 20, 1980).

On January 15, 1981, the PGDP submitted an application to the Commonwealth of Kentucky to develop a residential landfill. In turn, PGDP was issued Construction Permit 073.14 (C-746-S Landfill) on April 6, 1981, permitting an area of 16.8 acres with an area to be filled of 9.0 acres (DOE 1993).

Beginning in October 1981, the PGDP relocated a 0.3-mile reach of the NSDD to the west to allow construction of the C-746-S Landfill. Construction of Cell Number 1 of the C-746-S Landfill was completed on October 12, 1981 (DOE 1993). So in the early 1980s, PGDP began maintenance and operation of the C-746-S Residential Landfill.

PGDP applied for an inert landfill permit for the remaining construction spoils area, and Construction Permit 073.15 (C-746-T Landfill) was issued by the Commonwealth of Kentucky on February 5, 1985. The new permit addressed 20.1 acres with an area to be filled of 8.8 acres (DOE 1993).

In March 1987, EDGe submitted a groundwater monitoring plan for the C-746-S&T facility. In the plan, EDGe recommended that wells MW16, MW17, MW18, and MW19 be abandoned.

Table 1 summarizes key permit dates relative to the C-746-S&T Landfills.

**Table 1. C-746-S&T Landfills chronology of permitting events.**

DATE	EVENT
April 6, 1981	C-746-S: Permit to construct issued.
February 5, 1985	C-746-T: Permit to construct issued.
October 14, 1987	C-746-S: Renewal of permit
April 14, 1988	C-746-S: Renewal of permit
September 13, 1988	C-746-S: Certified complete construction of Cell No. 2, begin final closure of Cell No. 1
July 3, 1989	C-746-S: Renewal of permit
May 8, 1990	Groundwater monitoring regulations were revised/restructuring of KDEP SWMU Program (more stringent regulations prompted closure of -T Landfill).
October 1990	C-746-S: Certified closure of Cell No. 1.
December 31, 1991	C-746-S: Permit expired (renewal application pending).
June 30, 1992	C-746-T: Closure
July 22, 1992	C-746-S: KDEP issued letters of continuation.
November 12, 1992	C-746-T: Landfill certified "closed."
January 25, 1993	C-746-S: Cell No. 3 was certified "complete."
April 12, 1993	C-746-S: Receipt of continuation letter authorizing operation of Cell No. 3
July 1993	Solid Waste Landfill Permit Modifications for the Inert and Residential Landfill Permits
June 1995	C-746-S: Closure of Cell No. 3

The C-746-S Landfill was used for the disposal of trash and garbage from the PGDP. Initially, 110 ppm of uranium served as the waste acceptance criteria. Later disposal standards used at the landfill were 17 pCi/g of uranium, which corresponds to 25 ppm of uranium at natural assay. The materials were screened using a criterion of 100 counts per minute above background because there was no method for measuring the 17 pCi/g standard. No materials with detectable transuranics or technetium-99 ( $^{99}\text{Tc}$ ) were disposed of in the landfill (CH2M Hill 1992).

The trash was placed in a lined cell, initially compacted in place, and covered with soil. Later disposal procedure required the waste to be compacted prior to placement in the landfill cell. When a cell was filled, it was capped with clay and covered with soil. Because the waste cells in the landfill generally have been constructed on top of the natural land surface, the vertical extent of buried waste material is assumed to be the height of the landfill (approximately 20 ft) (CH2M Hill 1992).

The C-746-T Landfill was used to dispose of construction debris, such as concrete, wood, and rock, as well as steam plant fly ash. Like C-746-S Landfill, the C-746-T Landfill waste cells are assumed to be situated on top of the natural land surface; therefore, the vertical extent of buried waste is estimated at the height of the landfill (approximately 20 ft) (CH2M Hill 1992).

#### **SWMU 17: C-616-E Sludge Lagoon**

SWMU 17 is an L-shaped surface impoundment covering an area of 19,974 m<sup>2</sup> (215,000 ft<sup>2</sup>). It is constructed with a below-grade clay floor and above-grade earth/clay walls. The design depth of water in the lagoon is 3.8 m (12.5 ft). However, the depth of sludge (containing up to 2% chromium<sup>+3</sup> by weight) in the lagoon now averages approximately 1.8 m (6 ft).

The C-616-E Lagoon operated from 1977 to 1997 as a dewatering basin for sludge from the C-616 Liquid Pollution Abatement Facility. The Liquid Pollution Abatement Facility is a treatment facility originally used to reduce chromium (now phosphate) from wastewaters of the cooling towers and other nearby facilities.

During operation, effluent from the C-616-E Lagoon passed through a 30-cm (12-inch) overflow pipe to the C-616-F Lagoon in route to Bayou Creek through the Plant's Outfall 001 ditch system. During extreme rainfall events, some water may overflow to swales on the east side of the Lagoon where the overflow water ponds. Precipitation currently is the only source of flow entering the C-616-E Sludge Lagoon.

#### **SWMU 18: C-616-F Full Flow Lagoon**

SWMU 18 currently operates and is located adjacent to the C-616-E Sludge Lagoon (SWMU 17), north of the fenced plant security area and across from the C-616 Liquid Pollution Abatement Facility. The C-616-F Lagoon is a rectangular surface impoundment of 31,587 m<sup>2</sup> (340,000 ft<sup>2</sup>). It was constructed at the same time as the C-616-E Lagoon with a below-grade clay floor and above-grade earth/clay walls. The design depth of water in the Lagoon is 3.7 m (12 ft).

The C-616-F Lagoon began operation in 1977 and is a settling basin for effluent of the C-616 Liquid Pollution Abatement Facility and for water from the NSDD, which is pumped to the Lagoon by the C-616-C Lift Station. When C-616-E went off-line, walls and baffles of sheet piling were later added to the east end of the C-616-F Lagoon, and, beginning in 1997, the C-616-F Lagoon began receiving the effluent from the C-616 Liquid Pollution Abatement Facility clarifier. Overflow from the C-616-F Lagoon discharges through a weir on the west end of the C-616-F Lagoon to Bayou Creek via the Outfall 001 ditch system. Compliance monitoring at Outfall 001 to support a KPDES permit has shown that the effluent meets water quality standards. Precipitation accounts for a small amount of flow in the C-616-F Full Flow Lagoon.

#### **SWMU 58: NSDD (outside plant security area)**

The entire NSDD is located on property owned by the DOE. The NSDD originates within the north central portion of the PGDP and discharges into Little Bayou Creek to the north of the plant.

The portion of the NSDD outside of the security-fenced area (SWMU 58) is approximately 2,562 m (8,400 ft) long. The average width of this portion of the ditch is approximately 9.8 m (32 ft), and the depth ranges from approximately 1.5 to 4.6 m (5 to 15 ft). The banks of this portion of the ditch are generally vegetated with grasses and brush, and trees line some sections of the bank. Approximately 900 m (3,000 ft) of the NSDD (i.e., that portion nearest to Little Bayou Creek) fall within the 500-year floodplain of Little Bayou Creek, and some portions of this segment fall within the 100-year floodplain (COE 1994). The NSDD outside of the security-fenced area also is posted for radiological contamination (pursuant to 10 CFR 835 requirements).

The NSDD is an original design surface channel of the PGDP. Historically, the NSDD received wastewater from the C-400 Cleaning Building, coal pile runoff, and storm water. Discharges from C-400 processes began in 1957 (MMES 1995). The primary functions of the C-400 included cleaning, metal plating, metals recovery, radioactive materials stabilization and recovery, uranium trioxide production, diffusion process equipment testing, and uranium tetrafluoride (green salt) pulverization. Sources of runoff to the ditch include a steam plant (C-600), process buildings (C-335 and C-337), a cooling tower (C-635), and electrical switchyards (C-535 and C-537). As a consequence, the soil and sediment in the ditch have been contaminated. Over the years, fly ash and coal dust from the C-600 Steam Plant and sediment from the ditch watershed have nearly filled the southern (on-site) portion of the NSDD. This caused runoff from heavy rainfall events to overflow the ditch, primarily near 10th Street. In order to restore adequate flow, sediments periodically were dredged from the NSDD, and the spoils were placed near the banks of the ditch.

In 1977, the C-616-C Lift Station was constructed approximately 145 m (475 ft) upstream of the plant security fence. This lift station diverts all normal flow (from upstream locations) in the NSDD to the C-616-F Full Flow Lagoon for settlement of suspended solids prior to discharge through Outfall 001 ditch system to Bayou Creek. The C-616-H Lift Station (Ditch 001 Lift Station) began operation in 1991. This lift station pumps effluent of the C-335 and C-337 Process Buildings and the C-535 and C-537 Switchyards into the NSDD for downstream capture by the C-616-C Lift Station and treatment through the C-616-F Full Flow Lagoon.

In 1981/82, a portion of the NSDD located north of Ogden Landing Road was relocated to its present configuration to facilitate construction of the C-746-S&T Landfills. The segment of the NSDD around which flow was diverted was filled and now is covered by clean soil placed during construction of the landfills; however, this area is outside of the permitted area of the C-746-S&T Landfills.

Outside the security fence (SWMU 58), contaminants in the NSDD surface soils and sediment exceed acceptable risk levels for the recreational receptor and exceed ecological benchmark values. Historically, contaminants that would be expected to have the potential to leach were released to the NSDD from process operations, primarily in Building C-400. However, these releases were confined inside the plant security fence in 1977 with the construction of lift-station C-616 and eliminated totally in 1994 with the addition of treatment for the remaining discharges from the C-400 Building. As a result, any contaminants present in the NSDD that had the potential to leach are expected already to have migrated.

#### **Area of Concern 111: Concrete Rubble Pile 9**

AOC 111 is located inside the DOE boundary and lies adjacent to the abandoned access road portion of Ogden Landing Road, which runs east to west through the DOE property and north of the PGDP area. Traffic use has been restricted by the dumping of concrete construction spoils at the east and west ends of the access road. The AOC consists of three rubble piles. AOC 111A is 740 ft long and located on the east end of the access road. The west end of the access road is blocked by AOC 111B, which is 160 ft long. AOC 111C is a 50 ft long rubble pile that is located immediately northwest of AOC 111B. Some of the concrete is from the PGDP and is in very large pieces that possibly were used as footing material for transmission towers. The approximate volume of the concrete is 1146.8 m<sup>3</sup> (1,500 yd<sup>3</sup>). A detailed beta and gamma radiation survey was conducted and surface soil samples taken at this AOC. The radiation survey was conducted on a 6 m (20 ft) grid pattern. Between the east and west areas, 28 grids were surveyed, and it was concluded that 13 of the grids showed levels of radiation that exceeded Oak Ridge Operation Radioactive Contamination Control Policy for nonwork-surface contamination in a nonradiological area (3,000 dpm/100 cm<sup>2</sup>). This AOC is included in the Waste Area Group 17 Record of Decision that documents a need for no further action in this area.

#### **SWMU 145: Construction/Demolition Debris Disposal and Spoils Area**

SWMU 145 is located north of the PGDP security area and encompasses SWMUs 9 and 10. The SWMU is approximately 44 acres and began operation in the early 1950s. A 1973 document "*The Discard of Scrap Materials by Burial at the Paducah Plant*," states this area was used by the contractor for the construction of PGDP to discard all types of scrap and waste materials. Use of the area for discarding of scrap and waste by subcontractors was continued until the early 1980s. Construction/debris (such as concrete), roofing materials, wire, wood, and shingles with asbestos, and welding rods are expected to have been disposed of in the area. Approximately once a year, the accumulated scrap piles were moved by plant personnel into piles or earth depressions and, wherever practicable, covered with dirt. The area was later permitted for the construction and operation of the C-746-S&T Landfills.

## **SWMU 201: Northwest Plume**

Following the identification of contaminated groundwater in residential wells north of the PGDP in August 1988, the DOE conducted investigations to determine the nature and extent of groundwater contamination and to identify potential sources. These investigations and results, combined with related independent studies, have characterized a groundwater plume, known as the Northwest Plume.

Investigations have confirmed that the primary contaminants of the Northwest Plume are trichloroethene (TCE) (up to 16,000 µg/L) and  $^{99}\text{Tc}$  (up to 4,800 pCi/L), with only trace levels of TCE degradation products (1,1-DCE and 1,2-DCE) throughout the Regional Gravel Aquifer (RGA) plume. The only significant elevated degradation products (up to 3,000 µg/L vinyl chloride and 4,800 µg/L 1,2-DCE) appear to occur only in localized areas of the Upper Continental Recharge System (UCRS).

The Northwest Plume Investigation (DOE 1995) measured high levels of TCE and  $^{99}\text{Tc}$  in water samples from the upper RGA and UCRS in the northwest corner of the plant. However, the highest contaminant levels were present at the base of the RGA. The investigation report implied two sources to the Northwest Plume, the C-747-A Burial Grounds (northwest corner of the plant) and the C-400 Cleaning Building (central area of the plant). Upgradient samples of the Northwest Plume Investigation and later samples collected for the Northeast Plume Investigation indicated that the C-400 Cleaning Building was the location of the main dense nonaqueous-phase liquid (DNAPL) zone to the Northwest Plume.

Other findings of the Northwest Plume Investigation included:

- The Northwest Plume seems to be in equilibrium and will not reach the Ohio River;
- The C-616 Lagoon appears to be the source for a separate  $^{99}\text{Tc}$  plume;
- The leading edge and western boundary of the Northwest Plume are poorly known; and
- A high-hydraulic conductivity zone within the RGA influences the plume geometry.

## **SWMU 202: Northeast Plume**

Investigations conducted between March and December 1994 characterized the Northeast Plume. The primary contaminants of the Northeast Plume are TCE and  $^{99}\text{Tc}$ . Contaminant levels of Northeast Plume samples ranged up to 6,700 µg/L TCE and 712 pCi/L  $^{99}\text{Tc}$ . Occurrences of  $^{99}\text{Tc}$  in the Northeast Plume are limited to within the PGDP security fence and the immediately adjacent area. Sample analyses of many on-site RGA water samples (and some McNairy Formation water samples) reported the presence of TCE degradation products, but generally at levels of secondary importance.

The primary observations of the Northeast Plume Investigation based on the contaminant distribution included these:

- The southern edge of the Northeast Plume is sharply defined;
- The extent of contamination at the top of the RGA differs from the extent of contamination at the base of the RGA; and
- The C-400 area is primarily a source to the Northwest Plume.

The *Northeast Plume Preliminary Characterization Summary Report* (DOE 1995) concluded that the general presence of the highest dissolved TCE levels at the base of the RGA suggested the presence of a DNAPL source(s) for the Northeast Plume. However, the presence of high dissolved TCE concentrations at the top of the RGA may indicate proximity to a UCRS DNAPL source zone.

## CONCEPTUAL MODEL

### Geology/Hydrogeology

The subsurface at the PGDP site consists of approximately 350 ft of Cretaceous, Tertiary, and Quaternary sediments unconformably overlying Paleozoic bedrock. In the Jackson Purchase Region, these sediments dip gently to the south-southwest toward the axis of the Mississippi Embayment and overlie northward-dipping Paleozoic bedrock. In stratigraphic order, bedrock is overlaid by a rubble zone, the Cretaceous McNairy Formation, the Paleocene Porters Creek Clay, undifferentiated Eocene sediments, and Pliocene and Pleistocene continental deposits. However, at the C-746-S&T area, little to no Porters Creek Clay is present.

Pliocene and Pleistocene continental deposits unconformably overlie the Cretaceous through Eocene strata in the vicinity of the PGDP. Beginning under the south end of the PGDP and extending north beyond the Ohio River, a thick sequence of Pleistocene continental deposits fills the buried valley of the ancestral Tennessee River. This sediment package consists of a basal sand and gravel member, the lower continental deposits, and an overlying finer-textured lithofacies, the upper continental deposits. Where fully developed, the upper continental deposits include a bottom sand unit overlaid by a thick silt and clay interval containing at least two horizons of sand and gravel.

Silt of the Pleistocene Peorian Loess and an older unit, tentatively identified as the Roxanna Loess, covers sediments both north and south of the buried terrace slope (DOE 1997a). The loess deposit virtually is indistinguishable from silt facies of the upper member of the continental deposits. Loess typically is 3 to 5 m (10 to 15 ft) thick beneath most of the PGDP; however, construction activities have excavated the loess or replaced the loess with fill material in many areas. Soils of the area are predominantly silt loams that are poorly drained, acidic, and have little organic content.

The flow system in the vicinity of the PGDP exists primarily within unconsolidated sediments. The regional groundwater flow systems occur within the Mississippian Bedrock, Cretaceous McNairy Formation, Eocene Sands, Pliocene Terrace Gravel, Pleistocene Lower Continental Deposits, and Upper Continental Deposits (shown in Fig. 3). The focus of this package is the RGA, and the UCRS, further defined in the following subsections.

The RGA consists primarily of the coarse sand and gravel facies of the Lower Continental Deposits. Permeable sands of the Upper Continental Deposits and the McNairy Formation, where they occur adjacent to the Lower Continental Deposits are included in the RGA. The RGA is found throughout the plant area and to the north, but pinches out to the south, southeast, and southwest along the slope of the Porters Creek Terrace. Regionally, the RGA includes the Holocene-aged alluvium found adjacent to the Ohio River.

Lithology*	Hydrogeologic Units	Geologic Units
adapted from that of MW 86	HU1	Loess Deposits
	HU2	
	HU3	Upper Continental Deposits
	Regional Gravel Aquifer	Lower Continental Deposits
	McNairy Flow System	McNairy Formation
	Bedrock Aquifer	Rubble zone at top of Warsaw Limestone

\*Not to scale.

Base of Active Groundwater Flow System beneath PGDP

<b>Fig. 3. Hydrogeologic units.</b>	<b>U. S. DEPARTMENT OF ENERGY</b> DOE OAK RIDGE OPERATIONS PADUCAH GASEOUS DIFFUSION PLANT	
	<b>BECHTEL JACOBS COMPANY, LLC</b> <small>MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER US GOVERNMENT CONTRACT DE-AC-05-98OR22700</small> Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio	
	 <b>Science Applications International Corporation</b> <small>P.O. Box 2502 Oak Ridge, Tennessee 37831</small>	

The RGA is the shallow aquifer beneath the PGDP and is the dominant groundwater flow system in the area extending from the PGDP to the Ohio River. Regional groundwater flow within the RGA trends north-northeast toward base level, represented by the Ohio River; however, groundwater mounding has been identified in quarterly C-746-S&T Landfill reports (see **Fig. 4**).

The cores of the Northeast and Northwest Plumes, found to the east and west of the investigation area, are believed to delineate high-hydraulic-conductivity channels within the RGA. As such, these zones are expected to be the principal avenues for groundwater flow to the north. Measured hydraulic conductivity values of the Northeast and Northwest Plumes range from  $3.53 \times 10^{-1}$  to  $2.01 \text{ cm/s}$  (1,000 to 5,700 ft/d). The average hydraulic conductivity value for the RGA outside of the main plumes is on the order of  $3.53 \times 10^{-2} \text{ cm/s}$  (100 ft/d).

Differences in permeability and aquifer thickness also affect the hydraulic gradient. Low gradients in the north-central portion of the plant site are the result of a thick section of the RGA containing higher fractions of coarse sand and gravel. Northward, near the Ohio River, the hydraulic gradient increases as a result of either a thinner section of RGA or of low-permeability bottom sediments in the Ohio River. Further, it is within the RGA that groundwater contamination migrates offsite.

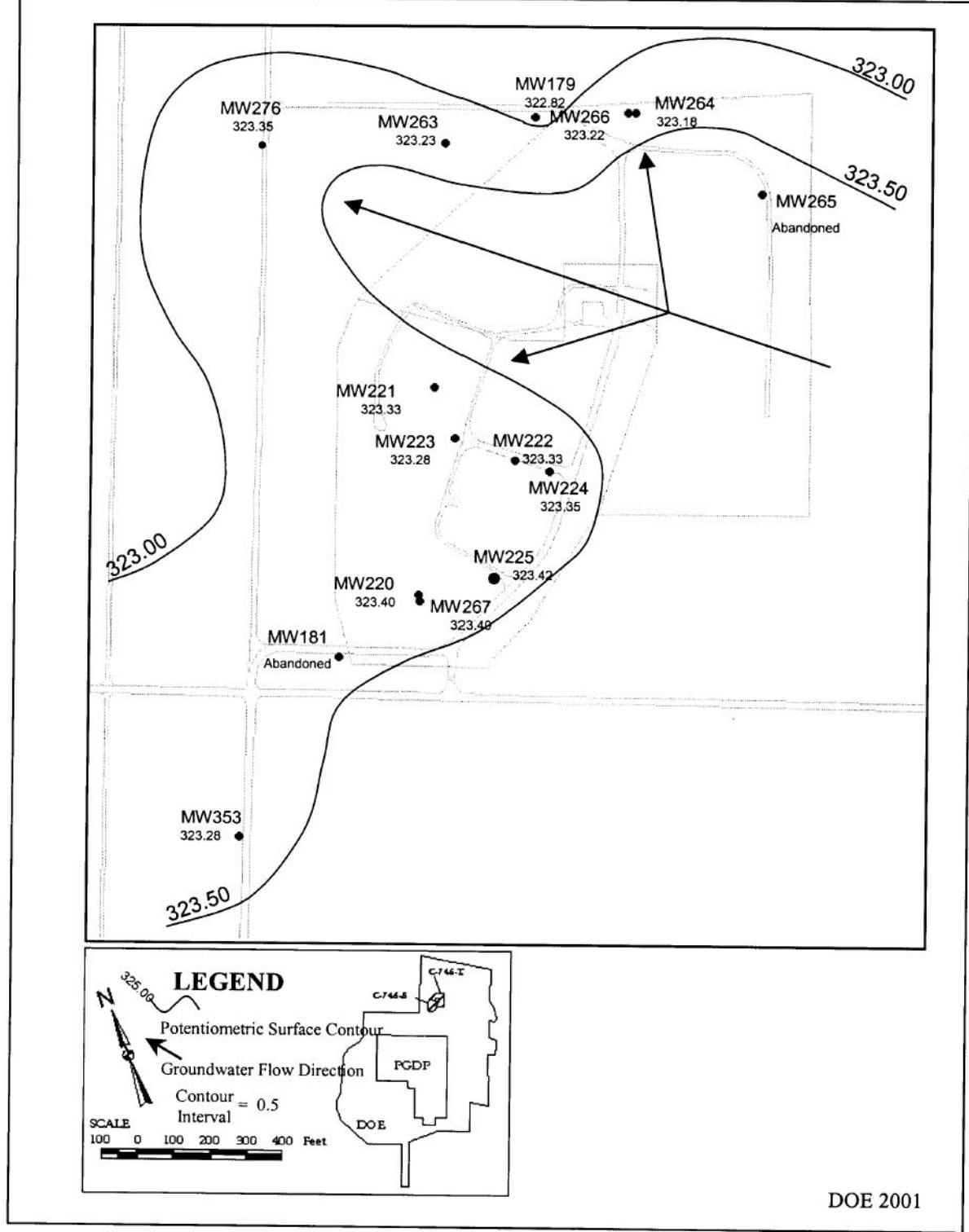
The UCRS consists of a thick surface loess unit and the Upper Continental Deposits. Hydrogeologists at the PGDP have differentiated the UCRS into three general horizons, which are as follows:

- Hydrologic Unit (HU) 1—an upper silt and clay interval (the surface loess unit);
- HU 2—an intervening interval of common sand and gravel lenses; and
- HU 3—a lower silt and clay interval.

Groundwater flow in the UCRS is predominately downward into the RGA, hence the term “recharge system.” Vertical hydraulic gradients generally range from 0.5 to 1 m/m where measured by wells completed at different depths in the UCRS. A strong hydraulic conductivity contrast exists between the UCRS, with an average conductivity value between  $1 \times 10^{-6}$  and  $1 \times 10^{-4} \text{ cm/s}$  ( $3 \times 10^{-3}$  and  $3 \times 10^{-1}$  ft/d), and the RGA, with an average hydraulic conductivity value of approximately  $1 \times 10^{-2} \text{ cm/s}$  (30 ft/d). It can be noted from lithologic data in the study area vicinity that the HU 2 generally declines in elevation in a northward direction in the study area.

### RGA Contaminant Plumes

The Northeast Plume, with trichloroethene as the primary contaminant, and the Northwest Plume, with both  $^{99}\text{Tc}$  and TCE as primary contaminants, bound the east and west sides, respectively, of the investigation area. A  $^{99}\text{Tc}$  plume extends northward from the area of the C-616 Lagoons through the west end of the investigation area. Recent data has been interpreted to indicate the presence of a splay of the Northwest Plume extending east of the C-616 Lagoons and northward to the west and north sides of the C-746-S&T Landfills (DOE 2001a). **Figures 5 and 6** present the PGDP groundwater contaminant plumes as mapped for calendar year 2000.



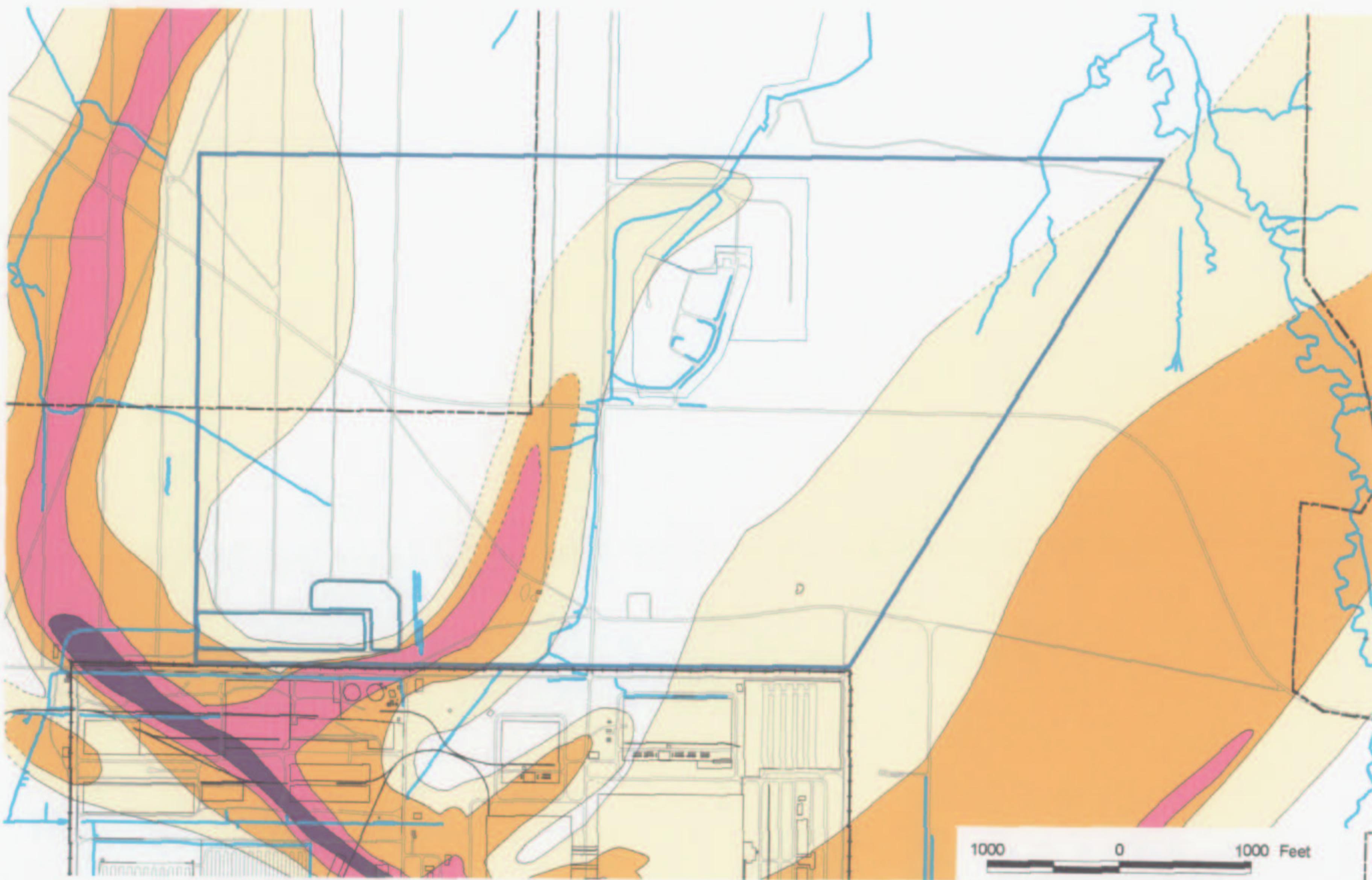
**Fig. 4. Potentiometric surface of the RGA at C-746-S&T Landfills, July 2001.**

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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S-T RI SCOPING AREA

TCE PLUME CONTOURS

●	100,000 ug/L
●	10,000 ug/L
■	1,000 ug/L
■	100 ug/L
■	5 ug/L



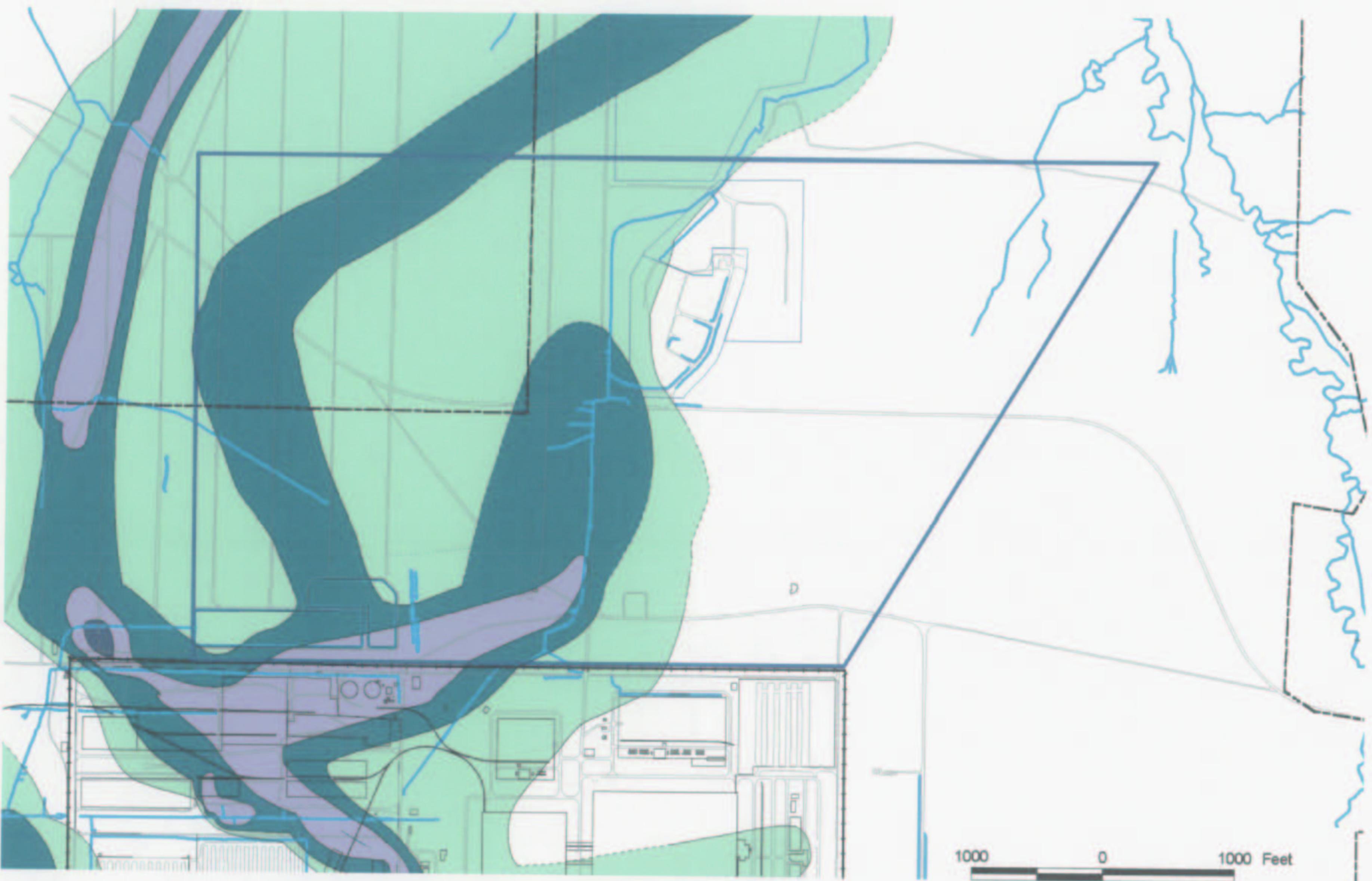
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Fig. 5. PGDP groundwater TCE plume as mapped for calendar year 2000.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S-T RI SCOPING AREA

Tc-99 PLUME CONTOURS

3790 pCi/L
900 pCi/L
100 pCi/L
25 pCi/L



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Fig. 6. PGDP groundwater Tc-99 plume as mapped for calendar year 2000.



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FIGURE No. c5ac90001sk094.apr  
DATE 08-12-01

The definition of the source of groundwater contaminants in the area of the C-746-S&T Landfills is a primary goal of this RI. Previous conceptual models for the groundwater contaminants in the area have ascribed the source to the C-746-S&T Landfills and to the NSDD. Recent water sample data from the perimeter of the PGDP in the area of the C-616 Lagoons revealed a plume of high levels of TCE and <sup>99</sup>Tc to the south and east of the lagoons (DOE 2000a). This plume was projected into the C-746-S&T area in the latest plume maps, primarily based upon the inferred groundwater flow direction as interpreted from trends of the RGA potentiometric surface.

### Potential Contaminant Sources

Potential contaminant sources for the C-746-S&T RI area include the following:

- C-746-S&T Landfills (SWMUs 9, 10, and 145);
- C-616;
- NSDD;
- Upgradient plumes; and
- Biofouling/corrosion of wells.

Much of the disposal that occurred at SWMU 10 and 145 was completed in unlined area; therefore, any debris that contained contamination would be a likely source of groundwater contamination. In July 1999, a tar-laden material was discovered west of the C-746-S Landfill. The debris had radioactive contamination of 43,000 disintegrations per minute. Samples of the material indicated elevated levels of uranium and technetium.

Moreover, the SWMU 9 area was used as a contractors' disposal area prior to permitting of the C-746-S Landfill. The nature of waste disposed of in the SWMU 9 area prior to landfill permitting is poorly documented. Based on the types of waste generated at the PGDP prior to permitting of the C-746-S&T Landfills, TCE and <sup>99</sup>Tc are recognized as likely contaminants associated with the landfills.

Although lined, hydraulic potential indicates that impounded water in the C-616-E/F Lagoons is infiltrating to the groundwater system. Radionuclides and metals are the primary contaminants of the C-616-E Lagoon. The preliminary list of contaminants related to the C-616-F Sludge Lagoon include phosphate, metals, radionuclides, polychlorinated biphenyls (PCBs), and pesticides, based on the knowledge of the historical operations conducted at the site and the contaminants associated with the NSDD.

Contaminants in the NSDD surface soils and sediments are expected to be available offsite (e.g., Little Bayou Creek) for migration during storm events via sediment transport. Currently, the NSDD is not expected to be a significant source of contaminants leaching to the subsurface soils or the groundwater. Contaminants present in the NSDD that had the potential to leach are expected already to have migrated.

The principal contaminants associated with the sediments and soils of the NSDD outside the PGDP security area are radionuclides, metals, and PCBs. A screen of analyses of soils and sediments from the NSDD against site background levels reveals a total of 24 metals and 8 radionuclides (Table 2) that are present at elevated levels (DOE 2001b).

**Table 2. Metals and radionuclides that exceed background levels<sup>a</sup> in soil and sediment samples from the NSDD (outside PGDP security area)**

CHEMICAL	Maximum Value <sup>b</sup>	
<b>Metals</b>		
Antimony	17.9	mg/kg
Arsenic	11	mg/kg
Beryllium	6.5	mg/kg
Cadmium	8.03	mg/kg
Calcium	16,900	mg/kg
Chromium	213	mg/kg
Cobalt	16	mg/kg
Copper	33.1	mg/kg
Iron	47,400	mg/kg
Lead	106	mg/kg
Manganese	1,450	mg/kg
Nickel	71.96	mg/kg
Silver	37.8	mg/kg
Thallium	25.9	mg/kg
Uranium	200	mg/kg
Zinc	69.5	mg/kg
<b>Radionuclides</b>		
Cesium-137	10.9	pCi/g
Neptunium-237	43.2	pCi/g
Plutonium-239	240	pCi/g
Technetium-99	3,900	pCi/g
Thorium-230	594	pCi/g
Uranium-234	120	pCi/g
Uranium-235	12	pCi/g
Uranium-238	314.1	pCi/g

Notes:

<sup>a</sup> Background levels used in the comparison were those for surface soil. These values and their sources are presented in DOE 2000b

<sup>b</sup> Values are found in the NSDD Offsite Binning Package presented to the Core Team in summer and fall 2000.

Based on the information and evaluations the following is known:

- Most of the contaminated soil and sediment is expected at depths that range from the surface to four ft bgs, with the greatest depths generally occurring onsite;
- The aerial extent of radionuclides and metals contamination is expected to be in intermittent areas coincidental with sediment deposition outside the security fence; and
- PCBs are frequently present at greater than 1 ppm levels along the northeast trending reach of the NSDD location north of the C-746-S&T Landfill and in intermittent areas elsewhere.

Upgradient plumes are migrating northward from PGDP; therefore, groundwater beneath the C-746-S&T Landfills could be contaminated by the migration. Further, a video survey of monitoring wells surrounding the C-746-S&T and other wells in the area indicated extensive biofouling and corrosion of the well screens. This would be expected to increase metal content in groundwater samples from the affected wells.

## Potential Contaminants Of Concern

Data were downloaded from the Paducah OREIS database and summarized in support of this task. Data summarized includes stations located within the boundary of the C-746-S&T RI scoping area (see **Fig. 1**) and all existing soil, sediment, and groundwater data. Surface water was not included in these summaries due to the transient nature of the media. Appendix A contains summary tables of the results of chemical analyses.

Appendix B contains maps depicting those results as compared to various criteria. Maps were created to depict groundwater sample locations in which a chemical exceeded a maximum contaminant level or other standard (50 pCi/L for beta activity, 0.015 mg/L for lead, any detection of organic or any detections of radionuclide were additionally used). Further, maps were created to show soil sample locations for each chemical identified for groundwater mapping.

The following analytes were detected in groundwater from the C-746-S&T Landfills RI scoping area and exceeded the standard in at least one location at a frequency of more than 10%. **Metals and Inorganics:** fluoride, antimony, dissolved antimony, arsenic, barium, beryllium, cadmium, dissolved cadmium, chromium, lead, dissolved lead, thallium, uranium, and dissolved uranium. **Radionuclides:** alpha activity, beta activity, radon-222, and <sup>99</sup>Tc. **Volatiles:** 1,1-dichloroethene and TCE.

## Potential Release And Exposure Pathways

Potential release and exposure pathways for the contaminant sources listed previously include infiltration to the surface and subsurface soils and groundwater migration. These potential pathways are illustrated in **Fig. 7** and described previously in the SITE HISTORY section.

## DATA QUALITY OBJECTIVES

The DQO process is a planning tool used to develop sampling designs for data collection activities that support decision making. DQOs use systematic planning and by using this planning process, the planning team can clearly separate and delineate data requirements for each problem/decision. The DQO Process can be used repeatedly throughout the life cycle of a project, as illustrated in **Fig. 8**.

A summary of the seven steps of the planning approach is presented below. Additionally, a draft problem statement has been presented under the step "State the Problem."

### State the Problem

This step describes the problem and develops a conceptual model of the environmental hazard to be investigated; establishes the planning team including the decision makers; and identifies available resources, constraints, and deadlines.

Compliance monitoring for the C-746-S&T Landfills has detected several contaminants in the RGA. Regarding the two main PGDP groundwater contaminants, both TCE and <sup>99</sup>Tc occur in the C-746-S&T area.

Trichloroethene, at generally low levels (1-5 ppb), is found across the landfill area. Some detections have exceeded MCLs. During calendar year 2000, the highest level of TCE monitored at the C-746-S&T area was 18 ppb.

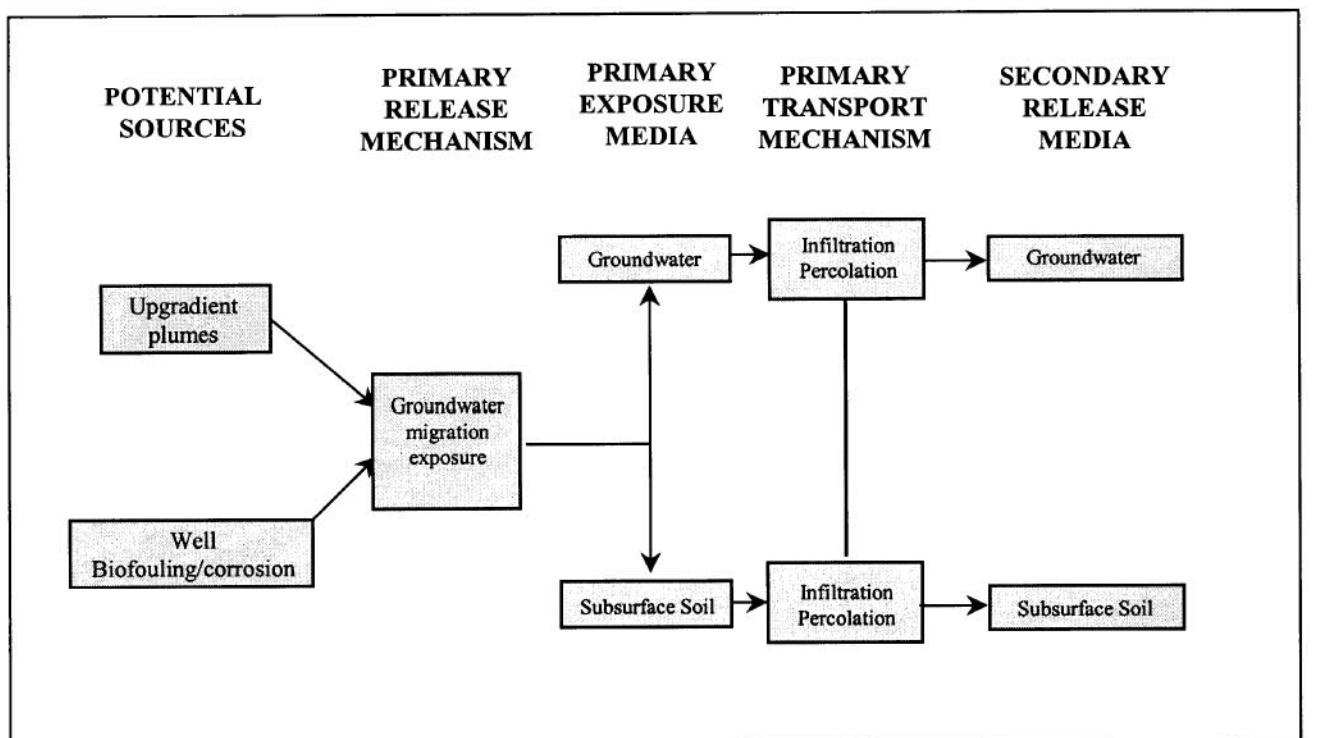
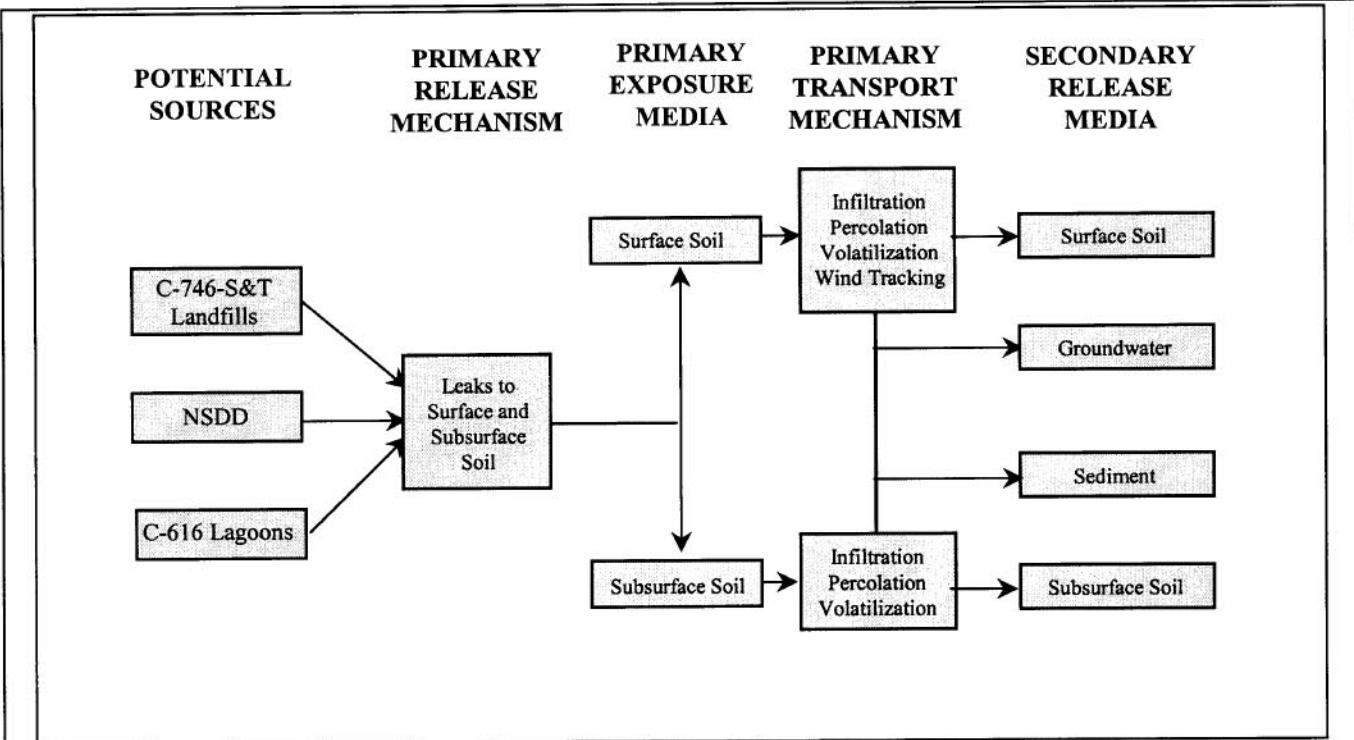


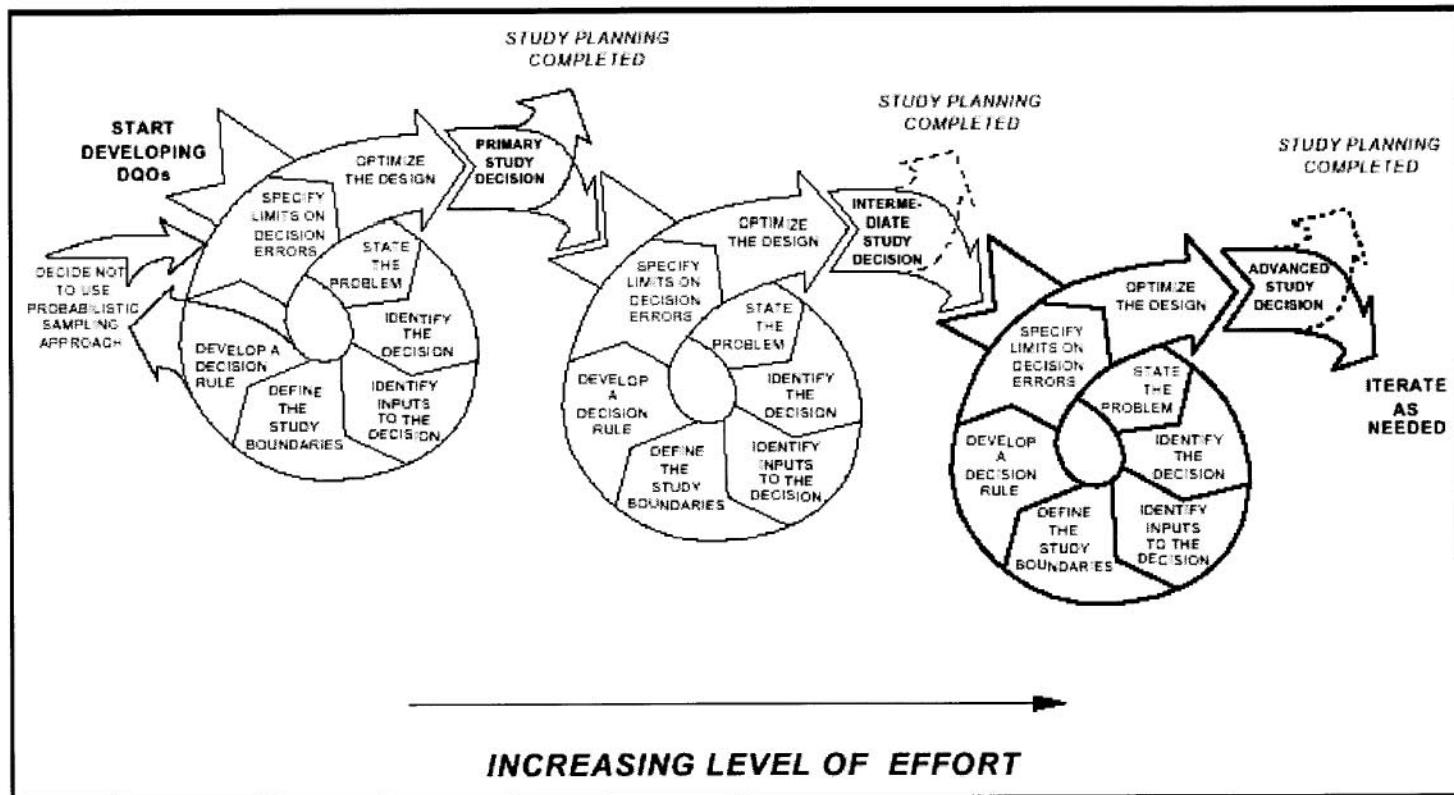
Fig. 7. Potential release and exposure pathways for C-746-S&T RI scoping area.

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EPA 2000.

Fig. 8. DQO process throughout lifecycle of a project.

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The highest levels of <sup>99</sup>Tc in the C-746-S&T Landfills are present in the upper RGA near the south end of C-746-S. A water sample from well MW181 contained 198 pCi/L during calendar year 2000. Other nearby wells typically monitor 30-40 pCi/L.

The draft problem statement for the C-746-S&T RI is as follows:

*"Groundwater contamination occurs in the RGA in the area of the C-746-S&T Landfills. The source of this contamination remains undefined."*

The project Core Team will identify the members of the planning team, which will be responsible for approving a schedule for the project. DOE, BJC, and its subcontractors will acquire the required resources.

### **Identify the Decision**

In this step, the principal study question is identified; alternative actions are defined; the principal study question and alternative actions are combined into a decision statement (may be based on regulatory guidelines) and each decision is stated in terms of whether to take action; and multiple decisions are organized into an order of priority.

The principal study questions are as follows.

*"Are the C-746-S&T Landfills, including the SWMU 145 Subcontractors' Staging Area and the abandoned stretch of the NSDD, a significant source of groundwater contamination?"*

*"Is the active NSDD located north of the PGDP security fence to the north end of the C-746-S&T Landfills a significant source of groundwater contamination?"*

*"Are the C-616 Lagoons, located north of the PGDP security fence to the north end of the C-746-S&T Landfills, a significant source of groundwater contamination?"*

Possible resolutions of the principal study question are that the contamination is derived from the C-746-S&T Landfills, from other SWMUs within the area, from upgradient sources, or, for some contaminants, from *in situ* degradation of well materials.

Alternative actions that could be taken to resolve each of the principal study questions include definition of the source and nature and extent of contamination (if the answer to the study question is "yes") or a decision of no further action (if the answer to any of the study questions is "no").

A decision statement to guide the Remedial Investigation follows:

*"If the C-746-S&T Landfills, including the SWMU 145 Subcontractors' Staging Area and the abandoned stretch of the NSDD, or the active NSDD located north of the PGDP security fence to the north end of the C-746-S&T Landfills, or the C-616 Lagoons are a significant source of groundwater contamination, then characterize the source of contamination and the nature and extent of contamination."*

### **Identify the Inputs to the Decision**

In "Identify the Inputs to the Decision," types of needed information and their sources are identified; the basis for setting an Action Level are determined; and the appropriateness of proposed sampling and analyses methods are confirmed.

The SITE HISTORY section of this binning package summarized the available information on historical practices known to be associated with the investigation area. Existing data are summarized in Appendices A and B.

The DQO meeting will be expected to set guidelines to identify contaminants of interest to this Remedial Investigation and appropriate assessment methods for the RI. Proposed action levels are identified as standards for comparison in Appendix A.

Other kinds of needed information include the following: environmental setting, regulatory setting, site history, groundwater flow rate and direction, and nature and extent of contamination.

### **Define the Boundaries of the Study**

“Boundaries of the study” defines the target population, determines the spatial and temporal boundaries, identifies practical constraints, and defines the scale of decision making. The proposed spatial boundaries of this RI are outlined in Fig. 1 as the study area.

Appendix B of this binning package provides a summary of contaminant nature and extent, in the form of maps, to be evaluated to focus the contaminants of interest to this RI.

This step of the DQO process will evaluate the utility of historical data to assess the source of current groundwater contaminants, the area to be evaluated, and the use to which the different types of data can be applied.

### **Develop a Decision Rule**

Development of a decision rule includes defining the population parameter; determining what action is needed; and confirming that the Action Level exceeds minimum detection limits.

The four main elements to a decision rule are (1) the parameter of interest, (2) the scale of decision making, (3) the action level, and (4) the alternative actions.

**Parameter of interest** is a descriptive measure (such as mean, median, or proportion) that specifies the attribute that the decision maker would like to know. The purpose of the data collection design is to produce environmental data than can be used to develop a reasonable estimate of the population parameter.

**Scale of decision making** refers to the smallest, most appropriate subset for which decisions will be made. The **action level** is a measurement threshold value of the parameter of interest. Action levels can be based on regulatory standards, exposure assessment, technology-based limits, or reference-based standards. Alternative actions describe the actions that the decision maker would take depending on the true value of the parameter of interest. The alternative actions are identified previously in *Identify the Decision*.

### **Specify Tolerable Limits on Decision Errors**

This step sets acceptable limits for decision errors relative to consequences (health effects, costs). The acceptable limits establish performance goals for the data collection design. Four activities are involved:

- (1) determine the possible range of the parameter of interest;
- (2) identify the decision errors and choose the null hypothesis;
- (3) specify a range of possible parameter values where the consequences of decision errors are relatively minor (the gray region); and
- (4) assign probability values to points above and below the gray region that reflect the tolerable probability for the occurrence of decision errors.

### **Optimize the Design for Obtaining Data**

In optimizing the design for obtaining data, a resource-effective sampling and analysis plan that meets the performance criteria is selected. This is the RI work plan.

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## **APPENDIX A**

**Table A.1. Analytes Never Detected in Groundwater.**

Analysis Type	Analyte	Units	Number of Measurements	Minimum SQL	Average SQL	Maximum SQL
<b>RGA</b>						
Metals	Uranium, Dissolved	mg/L	55	1.00E-03	1.00E-03	1.00E-03
<b>UCRS</b>						
Volatiles	1,1-Dichloroethene	mg/L	52	1.00E-03	3.40E-03	5.00E-03

**Table A.2. Summary Statistics for Analytes Detected in Groundwater.**

Analysis Type	Analyte	Units	Proportion Detected	Prop. "J" Det.	Freq. of MDL	Min. Detect	Arithmetic Mean	Std. Dev.	Median Result	Min. MDL	Avg. MDL	Max. MDL	Max. Detect	Standard	Standard Value	FOD above Standard
RGA																
Inorganics	Chloride	mg/L	749/749	0/749	204/749	2.34E-02	4.22E+01	1.50E+01	4.00E+01	2.50E-04	4.01E+00	2.00E+02	1.95E+02			
Inorganics	Fluoride	mg/L	320/320	0/320	8/320	1.00E-01	2.00E-01	6.87E-02	2.10E-01	1.00E-01	1.00E-01	1.00E-01	7.10E-01	MCL	4	0/320
Inorganics	Silica	mg/L	13/13	0/13	8/13	1.30E+01	1.56E+01	3.18E+00	1.40E+01	1.00E+00	1.00E+00	1.00E+00	2.00E+01			
Inorganics	Sulfate	mg/L	230/247	0/247	24/247	2.00E+00	3.91E+01	6.33E+01	1.70E+01	2.50E-01	5.22E+00	2.50E+01	4.19E+02			
Metals	Aluminum	mg/L	138/197	0/197	62/197	2.00E-02	8.97E+00	4.31E+01	3.10E-01	1.52E-02	2.03E-01	2.00E+00	5.08E+02			
Metals	Aluminum, Dissolved	mg/L	50/115	0/115	21/115	2.00E-02	1.07E-01	1.02E-01	1.00E-01	1.52E-02	3.72E-02	9.93E-02	4.58E-01			
Metals	Antimony	mg/L	8/569	0/569	195/569	1.70E-03	7.72E-02	5.25E-02	1.00E-01	8.70E-03	1.80E-01	2.50E-01	2.01E-01	MCL	0.006	3/569
Metals	Antimony, Dissolved	mg/L	26/123	0/123	25/123	2.20E-03	1.63E-02	2.87E-02	7.05E-03	8.70E-03	1.76E-02	5.20E-02	2.41E-01	MCL	0.006	6/123
Metals	Arsenic	mg/L	33/668	0/668	266/668	8.00E-04	2.71E-03	2.06E-03	2.50E-03	9.00E-04	5.07E-03	9.20E-03	3.60E-02	MCL	0.05	0/668
Metals	Arsenic, Dissolved	mg/L	3/80	0/80	28/80	5.00E-03	2.82E-03	2.95E-03	2.50E-03	8.00E-04	4.54E-03	9.20E-03	2.60E-02	MCL	0.05	0/80
Metals	Barium	mg/L	664/694	3/694	208/694	2.40E-02	2.26E-01	3.95E-01	2.08E-01	2.10E-03	4.15E-02	5.00E-02	8.97E+00	MCL	2	3/694
Metals	Barium, Dissolved	mg/L	528/538	0/538	139/538	2.30E-02	1.77E-01	9.80E-02	1.91E-01	2.10E-03	3.80E-02	5.00E-02	1.83E+00	MCL	2	0/538
Metals	Beryllium	mg/L	49/586	0/586	207/586	2.00E-04	5.80E-03	5.03E-03	2.50E-03	2.00E-04	6.56E-03	2.00E-02	3.90E-02	MCL	0.004	12/586
Metals	Cadmium	mg/L	28/712	0/712	259/712	1.00E-04	3.10E-03	1.99E-03	2.50E-03	6.00E-04	4.71E-03	5.00E-03	1.80E-02	MCL	0.005	4/712
Metals	Cadmium, Dissolved	mg/L	3/186	0/186	26/186	1.40E-03	3.61E-03	2.76E-03	5.00E-03	6.00E-04	2.52E-03	4.00E-03	3.10E-03	MCL	0.005	0/186
Metals	Calcium	mg/L	265/265	6/265	63/265	8.17E+00	3.40E+01	2.02E+01	2.66E+01	2.00E-02	5.56E-01	1.00E+00	1.12E+02			
Metals	Calcium, Dissolved	mg/L	131/131	0/131	1/131	1.48E+01	3.09E+01	1.53E+01	2.83E+01	2.00E-02	2.00E-02	2.00E-02	8.64E+01			
Metals	Chromium	mg/L	331/877	0/877	197/877	3.40E-03	1.92E-01	4.83E-01	2.50E-02	1.30E-03	3.83E-02	5.00E-02	5.40E+00	MCL	0.1	205/877
Metals	Chromium, Dissolved	mg/L	35/453	0/453	123/453	2.60E-03	2.21E-02	1.45E-02	2.50E-02	1.30E-03	3.11E-02	5.00E-02	1.98E-01	MCL	0.1	2/453
Metals	Cobalt	mg/L	94/592	0/592	208/592	1.30E-03	2.50E-02	5.12E-02	2.50E-02	2.40E-03	1.76E-02	5.00E-02	1.00E+00			
Metals	Cobalt, Dissolved	mg/L	21/147	0/147	22/147	3.60E-03	1.50E-02	9.79E-03	2.25E-02	2.40E-03	4.26E-03	1.50E-02	1.69E-02			
Metals	Copper	mg/L	99/829	0/829	193/829	1.00E-03	2.31E-02	2.28E-02	1.50E-02	9.00E-04	4.25E-02	1.00E-01	1.83E-01			
Metals	Copper, Dissolved	mg/L	23/208	0/208	21/208	1.40E-03	9.77E-03	1.86E-02	5.00E-03	9.00E-04	4.17E-03	7.00E-03	2.56E-01			
Metals	Iron	mg/L	787/879	0/879	207/879	1.00E-02	9.14E+00	5.02E+01	9.23E-01	1.48E-02	2.42E-01	2.00E+00	8.72E+02			
Metals	Iron, Dissolved	mg/L	129/255	0/255	11/255	1.00E-02	1.73E-01	5.37E-01	6.67E-02	1.21E-02	2.63E-02	8.01E-02	7.26E+00			
Metals	Lead	mg/L	48/825	0/825	251/825	1.10E-03	3.85E-02	3.37E-02	2.50E-02	5.00E-04	4.82E-02	5.00E-02	1.52E-01	SDWA	0.015	7/825
Metals	Lead, Dissolved	mg/L	17/148	0/148	17/148	5.00E-04	1.70E-02	2.19E-02	2.50E-02	4.00E-04	1.32E-03	3.00E-03	5.80E-02	SDWA	0.015	1/148
Metals	Magnesium	mg/L	263/263	0/263	63/263	3.56E+00	1.41E+01	9.58E+00	1.10E+01	4.00E-03	4.61E-02	5.00E-02	5.38E+01			
Metals	Magnesium, Dissolved	mg/L	132/132	0/132	1/132	5.98E+00	1.16E+01	5.55E+00	1.09E+01	4.00E-03	4.00E-03	4.00E-03	3.51E+01			
Metals	Manganese	mg/L	246/263	0/263	67/263	4.40E-03	9.08E-01	3.00E+00	1.30E-01	1.00E-03	4.34E-02	5.00E-02	3.14E+01			
Metals	Manganese, Dissolved	mg/L	112/122	0/122	5/122	3.30E-03	1.59E-01	4.58E-01	3.45E-02	1.10E-03	1.28E-03	2.00E-03	2.99E+00			
Metals	Mercury	mg/L	11/614	0/614	239/614	1.00E-04	1.08E-04	7.32E-05	1.00E-04	1.00E-04	1.94E-04	2.00E-04	7.00E-04	MCL	0.002	0/614
Metals	Mercury, Dissolved	mg/L	1/80	0/80	32/80	3.00E-04	9.50E-05	2.93E-05	1.00E-04	1.00E-04	1.62E-04	2.00E-04	3.00E-04	MCL	0.002	0/80
Metals	Nickel	mg/L	316/836	0/836	198/836	6.60E-03	1.24E-01	2.72E-01	2.50E-02	4.10E-03	4.49E-02	1.00E-01	4.34E+00			
Metals	Nickel, Dissolved	mg/L	64/216	0/216	18/216	5.80E-03	4.28E-02	4.20E-02	2.50E-02	3.90E-03	8.38E-03	3.40E-02	2.52E-01			
Metals	Potassium	mg/L	118/192	0/192	53/192	9.89E-01	2.84E+00	3.81E+00	1.60E+00	7.51E-02	1.88E+00	2.00E+00	3.20E+01			
Metals	Potassium, Dissolved	mg/L	52/107	0/107	5/107	1.03E+00	2.56E+00	4.76E+00	1.50E+00	1.01E+00	1.46E+00	1.62E+00	4.42E+01			
Metals	Selenium	mg/L	19/682	0/682	250/682	5.00E-04	2.42E-03	5.93E-04	2.50E-03	6.00E-04	4.77E-03	5.00E-03	9.00E-03	MCL	0.05	0/682
Metals	Selenium, Dissolved	mg/L	13/73	0/73	16/73	6.70E-04	2.01E-03	8.42E-04	2.50E-03	4.00E-04	1.54E-03	4.00E-03	3.70E-03	MCL	0.05	0/73
Metals	Silica	mg/L	10/10	0/10	0/10	9.00E+00	1.57E+01	3.13E+00	1.80E+01				1.90E+01			
Metals	Silver	mg/L	20/630	0/630	198/630	8.00E-04	1.88E-02	8.31E-03	1.50E-02	1.60E-03	3.48E-02	5.00E-02	9.70E-02	SDWA	0.05	1/630
Metals	Sodium	mg/L	781/781	9/781	206/781	6.43E+00	4.41E+01	1.78E+01	4.23E+01	4.00E-02	2.24E+00	5.00E+00	1.55E+02			
Metals	Sodium, Dissolved	mg/L	261/261	1/261	1/261	1.51E+01	4.20E+01	1.52E+01	4.13E+01	4.00E-02	4.00E-02	4.00E-02	1.52E+02			
Metals	Thallium	mg/L	2/565	0/565	197/565	1.00E-03	1.02E-01	8.16E-02	1.00E-01	7.00E-04	1.89E-01	4.00E-01	1.10E-03	MCL	0.002	0/565
Metals	Uranium	mg/L	23/756	0/756	162/756	1.00E-03	5.97E-04	7.67E-04	5.00E-04	1.00E-03	1.00E-03	1.00E-03	1.40E-02	MCL	0.02	0/756
Metals	Vanadium	mg/L	159/584	0/584	196/584	1.00E-03	6.44E-02	8.10E-02	5.00E-02	1.00E-03	5.96E-02	1.00E-01	1.14E+00			
Metals	Vanadium, Dissolved	mg/L	101/169	0/169	24/169	1.10E-03	4.84E-02	4.65E-02	4.50E-02	1.00E-03	5.09E-03	2.46E-02	2.52E-01			
Metals	Zinc	mg/L	308/835	0/835	188/835	2.60E-03	6.80E-02	9.43E-02	5.00E-02	2.60E-03	1.95E-01	2.00E-01	1.29E+00			
Metals	Zinc, Dissolved	mg/L	99/202	0/202	10/202	4.30E-03	2.65E-02	5.51E-02	1.50E-02	4.70E-03	1.66E-02	6.94E-02	6.07E-01			
Radionuclides	Alpha activity	pCi/L	480/1102	15/1102	235/1102	-	1.72E+00	5.64E+00	6.00E-01	1.10E+00	1.03E+01	1.90E+02	8.80E+01	MCL	15	15/1102
Radionuclides	Beta activity	pCi/L	844/1102	17/1102	235/1102	-	3.44E+01	8.92E+01	9.00E+00	1.70E+00	1.17E+01	2.10E+02	1.08E+03	ACO	50	124/1102
Radionuclides	Neptunium-237	pCi/L	4/50	0/50	15/50	1.00E-01	-1.20E+00	1.30E+01	1.00E+00	6.38E-01	6.72E+01	3.64E+02	5.00E-01			
Radionuclides	Plutonium-239	pCi/L	6/44	1/44	9/44	0.00E+00	1.30E-01	1.51E-01	5.00E-02	1.00E-01	1.06E+00	1.75E+00	6.00E-01			
Radionuclides	Radium-226	pCi/L	54/54	0/54	0/54	-3.00E-01	2.07E-01	2.63E-01	1.00E-01			9.00E-01	SDWA	20	0/54	

**Table A.2. Summary Statistics for Analytes Detected in Groundwater.**

Analysis Type	Analyte	Units	Proportion Detected	Prop. "J" Det.	Freq. of MDL	Min. Detect	Arithmetic Mean	Std. Dev.	Median Result	Min. MDL	Avg. MDL	Max. MDL	Standard Detect	Standard MDL	Standard Value	FOD above Standard		
Radionuclides	Radon-222	pCi/L	24/24	0/24	0/24	1.73E+02	3.64E+02	1.66E+02	1.61E+01	2.31E+01	1.61E+01	1.55E+03	6.97E+02	MCL	300	7/24		
Radionuclides	Technetium-99	pCi/L	72/1131	20/1131	11/131	0.00E+00	4.61E+01	1.24E+02	8.00E+00	1.30E+00	1.42E+01	6.00E+02	4.46E+01	7.23E+01	5.50E+03	MCL	900	
Radionuclides	Thorium-230	pCi/L	5/41	1/41	6/41	2.20E+01	1.83E+01	1.58E+01	1.42E+01	1.42E+01	1.42E+01	6.00E+02	4.46E+01	7.23E+01	5.50E+03	MCL	900	
Radionuclides	Uranium-234	pCi/L	18/37	7/37	4/37	4.00E+02	7.72E+01	1.76E+00	2.40E+01	1.30E+01	7.08E+01	1.50E+01	9.10E+00	9.10E+00	MCL	900		
Radionuclides	Uranium-235	pCi/L	3/37	0/37	3/37	1.00E+01	5.61E+02	7.64E+01	1.00E+01	3.00E+02	6.90E+01	1.07E+01	5.10E+01	1.07E+01	MCL	900		
Radionuclides	Uranium-238	pCi/L	12/37	5/37	4/37	3.50E+01	1.44E+00	4.27E+00	2.75E+01	1.50E+01	4.38E+01	6.00E+01	2.40E+01	5.10E+01	MCL	900		
Volatiles	1,1-Dichloroethene	mg/L	7/881	4/881	3/15/681	6.00E+04	2.83E+03	8.18E+03	2.50E+03	1.00E+03	6.70E+03	2.50E+01	1.00E+02	6.70E+03	MCL	0.007	2/681	
Volatiles	Trichloroethene	mg/L	65/1132	18/1132	3/15/1132	6.50E+05	1.68E+02	1.24E+01	1.00E+03	1.00E+03	1.75E+03	5.00E+02	2.20E+00	MCL	0.005	294/1132		
<b>UCRS</b>																		
Inorganics	Chloride	mg/L	96/99	0/99	3/99	1.47E+00	1.86E+01	4.00E+01	2.50E+01	2.58E+01	2.50E+01	5.00E+00	9.79E+01	MCL	8.90E+00	MCL	4	
Inorganics	Fluoride	mg/L	107/107	0/107	0/107	2.20E+01	6.76E+01	1.14E+00	2.10E+01	1.40E+01	2.10E+01	5.00E+00	8.90E+00	MCL	2/107			
Inorganics	Silica	mg/L	1/1	0/1	2/60	2.60E+01	2.60E+01	1.40E+01	1.40E+01	1.40E+01	1.40E+01	2.50E+00	2.50E+00	2.50E+00	2.60E+01			
Inorganics	Sulfate	mg/L	63/63	0/63	3/63	6.00E+00	1.05E+02	6.34E+01	1.70E+01	2.50E+00	2.50E+00	2.50E+00	2.50E+00	2.50E+00	2.50E+00	2.02E+02		
Metals	Aluminum	mg/L	11/11	0/11	3/11	5.49E+01	2.14E+01	2.14E+01	2.14E+01	2.14E+01	2.14E+01	2.00E+01	8.00E+01	2.00E+01	7.20E+02			
Metals	Aluminum, Dissolved	mg/L	6/11	0/11	1/11	1.50E+01	2.18E+01	1.00E+01	1.98E+02	7.07E+02	6.89E+01	6.27E+02	7.07E+02	6.89E+01	MCL	0.006	1/20	
Metals	Antimony	mg/L	4/20	0/20	4/20	2.00E+03	3.59E+02	5.68E+02	1.00E+01	1.82E+02	6.40E+02	2.00E+01	2.35E+01	2.00E+01	MCL	0.006	1/20	
Metals	Antimony, Dissolved	mg/L	3/20	0/20	5/20	2.70E+03	3.21E+02	5.45E+02	7.05E+03	1.82E+02	2.60E+02	2.34E+01	2.60E+02	2.34E+01	MCL	0.006	1/20	
Metals	Arsenic	mg/L	13/41	0/41	5/41	5.40E+03	9.12E+03	2.50E+03	2.00E+03	3.80E+03	5.00E+03	5.70E+02	5.00E+03	5.70E+02	MCL	0.05	1/41	
Metals	Arsenic, Dissolved	mg/L	4/18	0/18	2/18	2.10E+03	3.46E+03	3.42E+03	2.50E+03	2.00E+03	3.42E+03	2.00E+03	3.42E+03	2.00E+03	MCL	0.05	1/18	
Metals	Barium	mg/L	40/41	3/41	3/41	3.80E+02	3.11E+01	4.43E+01	2.08E+01	5.00E+02	5.00E+02	5.00E+02	5.00E+02	5.00E+02	2.60E+02	MCL	2/41	
Metals	Barium, Dissolved	mg/L	41/41	0/41	3/41	3.50E+02	2.42E+01	2.33E+01	1.91E+01	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	MCL	2	0/41
Metals	Beryllium	mg/L	3/21	0/21	4/21	1.00E+03	4.60E+03	9.19E+03	2.50E+03	1.00E+03	4.00E+03	5.00E+03	4.40E+02	4.40E+02	MCL	0.004	1/21	
Metals	Cadmium	mg/L	2/62	0/62	4/62	1.80E+02	5.48E+03	8.86E+03	2.50E+03	2.70E+03	3.93E+03	5.00E+03	1.90E+02	5.00E+03	1.90E+02	MCL	0.005	1/62
Metals	Cadmium, Dissolved	mg/L	1/36	0/36	6/36	1.40E+02	5.99E+03	2.75E+03	5.00E+03	1.10E+03	3.13E+03	4.00E+03	1.10E+03	4.00E+03	MCL	0.005	1/36	
Metals	Calcium	mg/L	36/36	0/36	3/36	8.38E+00	7.07E+01	5.26E+01	2.66E+01	5.00E+01	5.00E+01	5.00E+01	5.00E+01	5.00E+01	5.00E+01	MCL	2/41	
Metals	Calcium, Dissolved	mg/L	13/13	0/13	2/13	2.91E+01	7.78E+01	4.57E+01	2.83E+01	2.33E+01	2.33E+01	2.33E+01	2.33E+01	2.33E+01	2.33E+01	MCL	2	0/41
Metals	Chromium	mg/L	8/120	0/120	3/120	7.00E+02	3.23E+02	4.46E+02	2.50E+02	5.00E+02	5.00E+02	5.00E+02	4.55E+01	5.00E+03	1.90E+02	MCL	0.005	1/120
Metals	Chromium, Dissolved	mg/L	3/36	0/36	6/36	5.60E+02	2.23E+02	1.07E+02	2.50E+02	1.60E+03	1.60E+03	3.42E+03	6.90E+03	1.30E+03	MCL	0.005	1/36	
Metals	Cobalt	mg/L	4/21	0/21	4/21	1.71E+02	3.18E+02	3.29E+02	2.50E+02	4.00E+02	4.00E+02	8.50E+01	1.57E+01	1.57E+01	MCL	0.005	1/21	
Metals	Cobalt, Dissolved	mg/L	5/21	0/21	4/21	4.80E+03	2.44E+02	1.37E+02	2.25E+02	4.00E+03	4.00E+03	4.00E+03	4.00E+03	4.00E+03	MCL	0.005	1/21	
Metals	Copper	mg/L	95/120	0/120	3/120	1.00E+02	4.36E+01	5.97E+01	1.50E+02	5.00E+02	5.00E+02	5.00E+02	5.00E+02	5.00E+02	MCL	0.43E+00		
Metals	Copper, Dissolved	mg/L	22/40	0/40	4/40	7.80E+03	1.93E+01	3.68E+01	5.00E+03	1.40E+01	5.60E+03	7.00E+03	2.08E+00	5.00E+03	8.33E+02	MCL	0.005	1/21
Metals	Iron	mg/L	119/120	0/120	3/120	6.20E+02	1.13E+01	7.61E+01	9.23E+01	2.00E+01	8.00E+01	1.20E+01	8.00E+01	8.33E+02	MCL	0.1	1/120	
Metals	Iron, Dissolved	mg/L	21/42	0/42	2/42	1.00E+02	2.22E+00	7.62E+00	6.67E+02	3.70E+02	3.70E+02	3.70E+02	3.70E+02	3.70E+02	MCL	0.1	0/36	
Metals	Lead	mg/L	13/115	0/115	4/115	8.20E+03	8.54E+02	8.33E+02	2.50E+02	4.00E+03	8.50E+03	1.50E+03	1.10E+03	4.00E+02	MCL	0.005	10/115	
Metals	Lead, Dissolved	mg/L	3/26	0/26	4/26	2.10E+03	2.06E+02	1.19E+02	2.50E+02	5.00E+02	5.00E+02	5.00E+02	5.00E+02	5.00E+02	MCL	0.005	1/26	
Metals	Magnesium	mg/L	36/36	0/36	3/36	3.62E+00	2.58E+01	1.83E+01	1.83E+01	5.00E+02	5.00E+02	5.00E+02	5.00E+02	5.00E+02	MCL	0.005	1/36	
Metals	Magnesium, Dissolved	mg/L	13/13	0/13	0/13	1.17E+01	2.29E+01	1.23E+01	1.23E+01	1.09E+01	1.09E+01	1.09E+01	1.09E+01	1.09E+01	MCL	0.005	1/13	
Metals	Manganese	mg/L	34/37	0/37	3/37	5.00E+03	1.30E+00	2.06E+00	1.30E+01	5.00E+02	5.00E+02	5.00E+02	5.00E+02	5.00E+02	MCL	0.005	1/37	
Metals	Manganese, Dissolved	mg/L	14/14	0/14	0/14	5.00E+03	2.51E+00	2.85E+00	3.45E+02	5.00E+02	5.00E+02	5.00E+02	5.00E+02	5.00E+02	MCL	0.005	1/14	
Metals	Mercury	mg/L	4/36	0/36	6/36	4.00E+04	1.47E+04	1.46E+04	1.00E+04	2.00E+04	2.00E+04	8.00E+04	8.00E+04	MCL	0.002	0/36		
Metals	Mercury, Dissolved	mg/L	2/10	0/10	6/10	4.00E+04	1.55E+04	1.61E+04	1.00E+04	2.00E+04	2.00E+04	8.00E+04	8.00E+04	MCL	0.002	0/10		
Metals	Nickel	mg/L	38/119	0/119	3/119	3.74E+02	6.35E+02	9.63E+02	2.50E+02	5.00E+02	5.00E+02	5.00E+02	5.00E+02	5.00E+02	MCL	0.05	0/77	
Metals	Nickel, Dissolved	mg/L	11/37	0/37	1/37	1.16E+02	6.99E+02	1.04E+01	2.50E+02	7.00E+03	7.00E+03	7.00E+03	7.00E+03	7.00E+03	MCL	0.05	0/37	
Metals	Potassium	mg/L	8/13	0/13	3/13	1.80E+00	4.50E+02	6.82E+00	1.60E+00	2.00E+00	2.00E+00	2.00E+00	2.00E+00	2.00E+00	MCL	0.005	0/13	
Metals	Selenium	mg/L	4/57	0/57	2/57	1.40E+03	2.59E+03	5.41E+03	2.50E+03	5.00E+03	5.00E+03	5.00E+03	5.00E+03	5.00E+03	MCL	0.05	0/57	
Metals	Selenium, Dissolved	mg/L	3/7	0/7	3/7	1.40E+03	2.48E+03	2.84E+03	2.50E+03	3.00E+03	3.00E+03	3.00E+03	3.00E+03	3.00E+03	MCL	0.05	0/7	
Metals	Silica	mg/L	5/15	0/15	1/15	1.80E+01	2.32E+01	7.16E+00	1.80E+01	1.80E+01	1.80E+01	3.50E+01	3.50E+01	3.50E+01	MCL	0.05	0/15	
Metals	Silver	mg/L	1/34	0/34	4/34	4.50E+02	1.59E+02	7.65E+03	1.50E+02	3.80E+03	3.80E+03	3.80E+03	3.80E+03	3.80E+03	MCL	0.05	0/34	
Metals	Sodium	mg/L	89/89	0/89	3/89	1.10E+01	6.47E+01	3.40E+01	4.23E+01	2.00E+00	2.00E+00	2.00E+00	2.00E+00	2.00E+00	MCL	0.002	0/89	
Metals	Sodium, Dissolved	mg/L	38/38	0/38	0/38	2.15E+01	7.25E+01	4.49E+01	4.13E+01	2.00E+00	2.00E+00	2.00E+00	2.00E+00	2.00E+00	MCL	0.002	0/38	
Metals	Thallium	mg/L	1/18	0/18	4/18	8.20E+03	1.70E+02	2.46E+02	1.00E+01	1.40E+03	1.40E+03	1.40E+03	1.40E+03	1.40E+03	MCL	0.02	1/18	
Metals	Uranium	mg/L	83/129	0/129	5/129	1.00E+03	4.55E+02	1.43E+01	5.00E+04	1.00E+03	1.00E+03	1.00E+03	1.00E+03	1.00E+03	MCL	0.02	11/129	
Metals	Uranium, Dissolved	mg/L	19/25	0/25	1/25	1.00E+03	5.95E+02	1.51E+01	5.00E+04	1.00E+03	1.00E+03	1.00E+03	1.00E+03	1.00E+03	MCL	0.02	4/25	

**Table A.2. Summary Statistics for Analytes Detected in Groundwater.**

Analysis Type	Analyte	Units	Proportion Detected	Prop. "J" Det.	Freq. of MDL	Min. Detect	Arithmetic Mean	Std. Dev.	Median Result	Min. MDL	Avg. MDL	Max. MDL	Max. Detect	Standard	Standard Value	FOD above Standard
Metals	Vanadium	mg/L	15/20	0/20	5/20	5.00E-02	2.42E-01	3.23E-01	5.00E-02	1.04E-02	6.82E-02	1.00E-01	1.46E+00			
Metals	Vanadium, Dissolved	mg/L	12/19	0/19	6/19	4.60E-02	1.58E-01	1.74E-01	4.50E-02	1.10E-03	1.25E-02	3.23E-02	4.60E-01			
Metals	Zinc	mg/L	105/121	0/121	3/121	5.00E-03	4.78E-01	6.28E-01	5.00E-02	2.00E-01	2.00E-01	2.00E-01	3.24E+00			
Metals	Zinc, Dissolved	mg/L	31/41	0/41	3/41	5.00E-03	2.04E-01	3.21E-01	1.50E-02	4.70E-03	1.84E-02	2.65E-02	1.66E+00			
Radionuclides	Alpha activity	pCi/L	60/107	5/107	12/107	-	2.40E+01	6.54E+01	6.00E-01	2.10E+00	5.49E+00	1.27E+01	3.49E+02	MCL	15	14/107
Radionuclides	Beta activity	pCi/L	73/107	4/107	12/107	1.00E-03	7.09E+01	1.82E+02	9.00E+00	1.80E+00	4.65E+00	8.81E+00	1.34E+03	ACO	50	22/107
Radionuclides	Neptunium-237	pCi/L	3/12	0/12	3/12	4.00E-02	8.07E-01	9.29E-01	1.00E+00	5.00E-02	3.46E-01	4.94E-01	2.83E+00			
Radionuclides	Plutonium-239	pCi/L	2/10	0/10	1/10	5.00E-02	6.05E-02	8.38E-02	5.00E-02	9.80E-01	9.80E-01	9.80E-01	2.50E-01			
Radionuclides	Radium-226	pCi/L	21/21	0/21	0/21	0.00E+00	2.14E-01	2.57E-01	1.00E-01				8.00E-01	SDWA	20	0/21
Radionuclides	Radon-222	pCi/L	3/3	0/3	0/3	3.00E+02	3.90E+02	1.15E+02	3.15E+02				5.19E+02	MCL	300	1/3
Radionuclides	Technetium-99	pCi/L	109/148	5/148	12/148	0.00E+00	2.28E+01	4.98E+01	8.00E+00	1.30E+01	1.49E+01	1.70E+01	3.75E+02	MCL	900	0/148
Radionuclides	Thorium-230	pCi/L	7/11	1/11	2/11	1.30E-01	7.48E-01	8.95E-01	1.42E-01	5.94E-01	6.19E-01	6.43E-01	2.83E+00			
Radionuclides	Uranium-234	pCi/L	9/9	2/9	0/9	1.20E+00	4.64E+01	6.68E+01	2.40E-01				1.50E+02			
Radionuclides	Uranium-235	pCi/L	5/11	1/11	2/11	6.00E-02	1.54E+00	2.54E+00	1.00E-01	9.32E-01	9.37E-01	9.42E-01	6.42E+00			
Radionuclides	Uranium-238	pCi/L	9/9	2/9	0/9	1.53E+00	7.18E+01	1.07E+02	2.75E-01				2.60E+02			
Volatiles	Trichloroethene	mg/L	20/147	4/147	20/147	2.00E-04	9.68E-03	6.66E-02	1.00E-03	1.00E-03	1.00E-03	1.00E-03	6.10E-01	MCL	0.005	6/147

**Table A.3. Analytes Never Detected in Soil.**

Analysis Type	Analyte	Units	Number of Measurements	Minimum SQL	Average SQL	Maximum SQL
Inorganics	Cyanide	mg/kg	78	1.20E-04	7.01E-01	5.30E+00
Metals	Boron	mg/kg	23	1.00E+02	1.41E+02	2.00E+02
Metals	Gallium	mg/kg	1			
Metals	Germanium	mg/kg	1			
Metals	Gold	mg/kg	1			
Metals	Indium	mg/kg	1			
Metals	Palladium	mg/kg	1			
Metals	Platinum	mg/kg	1			
Metals	Tellurium	mg/kg	1			
Other Organics	2,3,7,8-Tetrachlorodibenzo-p-dioxin	mg/kg	2	1.00E-04	1.50E-04	2.00E-04
Other Organics	2,3,7,8-Tetrachlorodibenzofuran	mg/kg	2	1.00E-04	1.00E-04	1.00E-04
Other Organics	4,4'-DDD	mg/kg	70	1.20E-04	2.44E-01	1.10E+01
Other Organics	4,4'-DDE	mg/kg	70	1.20E-04	2.41E-01	1.10E+01
Other Organics	Aldrin	mg/kg	70	6.00E-05	1.21E-01	5.60E+00
Other Organics	alpha-BHC	mg/kg	69	2.20E-03	1.23E-01	5.60E+00
Other Organics	alpha-Chlordane	mg/kg	70	6.10E-04	1.20E+00	5.60E+01
Other Organics	beta-BHC	mg/kg	70	6.00E-05	1.22E-01	5.60E+00
Other Organics	delta-BHC	mg/kg	70	6.00E-05	1.22E-01	5.60E+00
Other Organics	Dieldrin	mg/kg	70	1.20E-04	2.40E-01	1.10E+01
Other Organics	Endosulfan I	mg/kg	70	6.00E-05	1.22E-01	5.60E+00
Other Organics	Endosulfan II	mg/kg	70	1.20E-04	2.41E-01	1.10E+01
Other Organics	Endosulfan sulfate	mg/kg	70	1.20E-04	2.44E-01	1.10E+01
Other Organics	Endrin	mg/kg	70	1.20E-04	2.42E-01	1.10E+01
Other Organics	Endrin ketone	mg/kg	70	1.20E-04	2.46E-01	1.10E+01
Other Organics	gamma-Chlordane	mg/kg	70	6.10E-04	1.20E+00	5.60E+01
Other Organics	Heptachlor	mg/kg	70	6.00E-05	1.21E-01	5.60E+00
Other Organics	Heptachlor epoxide	mg/kg	70	6.00E-05	1.22E-01	5.60E+00
Other Organics	Hexachloro-dibenzo[b,e][1,4]dioxin	mg/kg	2	1.00E-04	1.50E-04	2.00E-04
Other Organics	Lindane	mg/kg	70	6.00E-05	1.21E-01	5.60E+00
Other Organics	Methoxychlor	mg/kg	70	6.10E-04	1.21E+00	5.60E+01
Other Organics	PCB-1016	mg/kg	105	6.10E-04	8.60E-01	5.60E+01
Other Organics	PCB-1221	mg/kg	105	6.10E-04	8.81E-01	5.60E+01
Other Organics	PCB-1232	mg/kg	105	6.10E-04	8.81E-01	5.60E+01
Other Organics	PCB-1268	mg/kg	32	1.00E-01	1.50E-01	1.00E+00
Other Organics	Pentachloro-dibenzo[b,e][1,4]dioxin	mg/kg	2	1.00E-04	1.00E-04	1.00E-04
Other Organics	Pentachlorodibenzofuran	mg/kg	2	1.00E-04	1.00E-04	1.00E-04
Other Organics	Tetrachloro-dibenzo[b,e][1,4]dioxin	mg/kg	2	1.00E-04	1.50E-04	2.00E-04

**Table A.3. Analytes Never Detected in Soil.**

Analysis Type	Analyte	Units	Number of Measurements	Minimum SQL	Average SQL	Maximum SQL
Other Organics	Tetrachlorodibenzofuran	mg/kg	2	1.00E-04	1.00E-04	1.00E-04
Other Organics	Toxaphene	mg/kg	70	1.21E-03	2.44E+00	1.10E+02
Radionuclides	Americium-243	pCi/g	15	3.18E-02	8.51E-02	3.09E-01
Radionuclides	Antimony-124	pCi/g	19	1.70E-02	4.18E-02	2.16E-01
Radionuclides	Antimony-125	pCi/g	19	5.30E-02	1.20E-01	6.09E-01
Radionuclides	Barium-133	pCi/g	19	2.40E-02	5.17E-02	2.61E-01
Radionuclides	Barium-140	pCi/g	19	7.40E-02	2.13E-01	1.13E+00
Radionuclides	Beryllium-7	pCi/g	15	1.60E-01	3.58E-01	1.95E+00
Radionuclides	Bismuth-211	pCi/g	19	2.40E-01	5.62E-01	2.93E+00
Radionuclides	Cerium-139	pCi/g	19	1.71E-02	7.51E-02	7.50E-01
Radionuclides	Cerium-141	pCi/g	19	3.15E-02	8.22E-02	3.28E-01
Radionuclides	Cerium-144	pCi/g	19	1.24E-01	2.92E-01	1.29E+00
Radionuclides	Cesium-134	pCi/g	19	1.60E-02	3.88E-02	2.06E-01
Radionuclides	Cesium-136	pCi/g	19	2.80E-02	7.84E-02	4.44E-01
Radionuclides	Chromium-51	pCi/g	19	1.60E-01	3.70E-01	1.82E+00
Radionuclides	Cobalt-56	pCi/g	19	1.90E-02	4.40E-02	2.43E-01
Radionuclides	Cobalt-57	pCi/g	19	1.52E-02	3.70E-02	1.59E-01
Radionuclides	Cobalt-58	pCi/g	19	1.40E-02	4.33E-02	2.50E-01
Radionuclides	Europium-152	pCi/g	19	5.10E-02	1.19E-01	5.92E-01
Radionuclides	Europium-154	pCi/g	19	3.15E-02	7.67E-02	3.27E-01
Radionuclides	Europium-155	pCi/g	19	6.96E-02	1.67E-01	6.88E-01
Radionuclides	Iridium-192	pCi/g	19	1.70E-02	3.96E-02	2.07E-01
Radionuclides	Iron-59	pCi/g	19	3.00E-02	8.76E-02	4.83E-01
Radionuclides	Lead-211	pCi/g	19	2.40E-01	5.62E-01	2.93E+00
Radionuclides	Manganese-54	pCi/g	19	1.80E-02	4.83E-02	2.83E-01
Radionuclides	Mercury-203	pCi/g	19	1.90E-02	4.48E-02	2.13E-01
Radionuclides	Neodymium-147	pCi/g	19	9.30E-02	2.60E-01	9.15E-01
Radionuclides	Neptunium-239	pCi/g	19	1.90E-01	1.32E+00	4.49E+00
Radionuclides	Niobium-94	pCi/g	19	1.40E-02	4.26E-02	2.52E-01
Radionuclides	Niobium-95	pCi/g	19	2.20E-02	6.91E-02	2.95E-01
Radionuclides	Promethium-144	pCi/g	15	1.60E-02	3.89E-02	2.17E-01
Radionuclides	Promethium-146	pCi/g	19	2.50E-02	5.76E-02	2.92E-01
Radionuclides	Radon-219	pCi/g	19	1.40E-01	3.44E-01	1.78E+00
Radionuclides	Ruthenium-106	pCi/g	19	1.50E-01	3.93E-01	2.13E+00
Radionuclides	Silver-110m	pCi/g	19	1.70E-02	4.25E-02	2.19E-01
Radionuclides	Sodium-22	pCi/g	19	1.40E-02	4.64E-02	2.70E-01
Radionuclides	Thorium-227	pCi/g	19	1.20E-01	2.83E-01	1.36E+00

**Table A.3. Analytes Never Detected in Soil.**

Analysis Type	Analyte	Units	Number of Measurements	Minimum SQL	Average SQL	Maximum SQL
Radionuclides	Thorium-229	pCi/g	19	7.19E-02	1.59E-01	6.90E-01
Radionuclides	Yttrium-88	pCi/g	19	1.20E-02	4.26E-02	2.74E-01
Radionuclides	Zinc-65	pCi/g	19	3.40E-02	1.20E-01	5.61E-01
Radionuclides	Zirconium-95	pCi/g	19	2.10E-02	6.48E-02	2.80E-01
Semivolatiles	1,2,4-Trichlorobenzene	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	1,2-Diphenylhydrazine	mg/kg	39	3.50E-01	3.85E-01	4.40E-01
Semivolatiles	1,3-Dichlorobenzene	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	1,4-Dichlorobenzene	mg/kg	85	3.50E-01	1.45E+01	4.90E+02
Semivolatiles	2,4,5-Trichlorophenol	mg/kg	85	4.50E-01	1.61E+01	4.90E+02
Semivolatiles	2,4,6-Trichlorophenol	mg/kg	85	3.50E-01	1.45E+01	4.90E+02
Semivolatiles	2,4-Dichlorophenol	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	2,4-Dimethylphenol	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	2,4-Dinitrophenol	mg/kg	69	4.50E-01	2.48E+00	1.90E+01
Semivolatiles	2,4-Dinitrotoluene	mg/kg	85	3.50E-01	1.45E+01	4.90E+02
Semivolatiles	2,6-Dinitrotoluene	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	2-Chloronaphthalene	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	2-Chlorophenol	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	2-Methyl-4,6-dinitrophenol	mg/kg	69	4.50E-01	2.48E+00	1.90E+01
Semivolatiles	2-Methylphenol	mg/kg	72	3.50E-01	1.70E+01	4.90E+02
Semivolatiles	2-Nitrobenzenamine	mg/kg	82	4.50E-01	2.17E+00	1.90E+01
Semivolatiles	2-Nitrophenol	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	3,3'-Dichlorobenzidine	mg/kg	69	4.50E-01	1.01E+00	7.40E+00
Semivolatiles	3-Nitrobenzenamine	mg/kg	82	4.50E-01	2.17E+00	1.90E+01
Semivolatiles	4-Bromophenyl phenyl ether	mg/kg	69	3.50E-01	5.14E-01	3.70E+00
Semivolatiles	4-Chloro-3-methylphenol	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	4-Chlorobenzenamine	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	4-Chlorophenyl phenyl ether	mg/kg	69	3.50E-01	5.14E-01	3.70E+00
Semivolatiles	4-Methylphenol	mg/kg	72	3.50E-01	1.70E+01	4.90E+02
Semivolatiles	4-Nitrobenzenamine	mg/kg	82	4.50E-01	2.17E+00	1.90E+01
Semivolatiles	4-Nitrophenol	mg/kg	82	4.50E-01	2.17E+00	1.90E+01
Semivolatiles	Acenaphthylene	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	Benzenemethanol	mg/kg	67	3.50E-01	5.15E-01	3.70E+00
Semivolatiles	Benzoic acid	mg/kg	67	1.70E+00	2.54E+00	1.90E+01
Semivolatiles	Bis(2-chloroethoxy)methane	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	Bis(2-chloroethyl) ether	mg/kg	69	3.50E-01	5.14E-01	3.70E+00
Semivolatiles	Bis(2-chloroisopropyl) ether	mg/kg	69	3.50E-01	5.14E-01	3.70E+00
Semivolatiles	Di-n-octylphthalate	mg/kg	82	3.50E-01	5.11E-01	3.70E+00

**Table A.3. Analytes Never Detected in Soil.**

Analysis Type	Analyte	Units	Number of Measurements	Minimum SQL	Average SQL	Maximum SQL
Semivolatiles	Diethyl phthalate	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	Dimethyl phthalate	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	Hexachlorobenzene	mg/kg	85	3.50E-01	1.45E+01	4.90E+02
Semivolatiles	Hexachlorobutadiene	mg/kg	85	3.50E-01	1.45E+01	4.90E+02
Semivolatiles	Hexachlorocyclopentadiene	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	Hexachloroethane	mg/kg	85	3.50E-01	1.45E+01	4.90E+02
Semivolatiles	Isophorone	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	N-Nitroso-di-n-propylamine	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	Nitrobenzene	mg/kg	85	3.50E-01	1.45E+01	4.90E+02
Semivolatiles	Pentachlorophenol	mg/kg	85	3.90E-01	1.61E+01	4.90E+02
Semivolatiles	Phenol	mg/kg	82	3.50E-01	5.11E-01	3.70E+00
Semivolatiles	Pyridine	mg/kg	5	4.50E-01	2.38E+02	4.90E+02
Semivolatiles	Total Cresols	mg/kg	3	5.20E+02	7.93E+02	9.80E+02
Volatiles	1,1,1-Trichloroethane	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	1,1,2-Trichloroethane	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	1,1-Dichloroethane	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	1,1-Dichloroethene	mg/kg	121	5.00E-03	8.54E-02	1.20E+00
Volatiles	1,2-Dichloroethane	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	1,2-Dichloroethene	mg/kg	71	5.00E-03	7.76E-03	5.10E-02
Volatiles	1,2-Dichloropropane	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	2-Hexanone	mg/kg	103	1.00E-02	4.84E-02	1.20E+00
Volatiles	Bromodichloromethane	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	Bromoform	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	Bromomethane	mg/kg	103	1.00E-02	4.92E-02	1.20E+00
Volatiles	Carbon tetrachloride	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	Chloroethane	mg/kg	103	1.00E-02	4.92E-02	1.20E+00
Volatiles	Chloromethane	mg/kg	103	1.00E-02	4.92E-02	1.20E+00
Volatiles	cis-1,2-Dichloroethene	mg/kg	50	1.00E-02	2.03E-01	1.20E+00
Volatiles	cis-1,3-Dichloropropene	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	Dibromochloromethane	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	Dichlorodifluoromethane	mg/kg	8	2.00E-02	2.00E-02	2.00E-02
Volatiles	Styrene	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	Tetrachloroethene	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	trans-1,2-Dichloroethene	mg/kg	50	1.00E-02	2.03E-01	1.20E+00
Volatiles	trans-1,3-Dichloropropene	mg/kg	103	5.00E-03	4.31E-02	1.20E+00
Volatiles	Vinyl acetate	mg/kg	74	1.10E-02	6.35E-02	1.20E+00
Volatiles	Vinyl chloride	mg/kg	121	1.00E-03	2.76E-01	1.30E+01

**Table A.4. Summary Statistics for Analytes Detected in Soil.**

Analysis Type	Analyte	Units	Proportion Detected	Prop. "J" Det.	Freq. of MDL	Min. Detect	Arithmetic Mean	Std. Dev.	Median Result	Min. MDL	Avg. MDL	Max. MDL	Max. Detect	FOD above 1X Bkgd.	FOD above 2X Bkgd.	FOD above 10X Bkgd.
Inorganics	Iodide	mg/kg	3/8	0/8	0/8	1.54E+01	1.72E+01	2.37E+01	9.50E+00				7.22E+01	NA	NA	NA
Inorganics	Total Organic Carbon (TOC)	mg/kg	5/5	0/5	0/5	9.20E+02	3.82E+03	4.16E+03	2.70E+03				1.10E+04	NA	NA	NA
Inorganics	Total Phosphate as Phosphorus	mg/kg	10/12	0/12	0/12	1.12E+02	3.92E+02	2.64E+02	4.02E+02				9.76E+02	NA	NA	NA
Metals	Aluminum	mg/kg	110/110	0/110	25/110	1.03E+01	8.26E+03	4.68E+03	7.84E+03	4.00E-02	1.92E+01	2.00E+01	2.45E+04	18/110	0/110	0/110
Metals	Antimony	mg/kg	15/111	0/111	83/111	5.00E-01	2.96E+01	1.42E+02	6.20E+00	4.00E-02	1.19E+01	2.00E+01	1.32E+03	15/111	15/111	11/111
Metals	Arsenic	mg/kg	90/122	1/122	54/122	4.30E-03	1.69E+01	1.35E+02	2.75E+00	2.00E-03	3.93E+00	5.00E+00	2.74E+01	14/122	2/122	0/122
Metals	Barium	mg/kg	136/137	0/137	43/137	1.36E-01	9.27E+01	1.17E+02	7.24E+01	1.00E+00	3.09E+00	1.39E+01	1.16E+03	7/137	3/137	0/137
Metals	Beryllium	mg/kg	85/128	0/128	5.20E-02	8.70E-01	1.26E+00	5.90E-01	7.00E-04	5.25E-01	1.80E+00	8.50E+00	35/128	12/128	2/128	
Metals	Bismuth	mg/kg	1/19	0/19	0/19	4.00E+01	1.04E+01	2.38E+01	2.00E+00				4.00E+01	NA	NA	NA
Metals	Cadmium	mg/kg	36/139	0/139	77/139	2.60E-01	3.52E+00	2.54E+01	1.00E+00	7.00E-04	1.60E+00	7.21E+00	8.03E+00	36/139	30/139	11/139
Metals	Calcium	mg/kg	108/108	0/108	24/108	6.71E-01	3.73E+03	7.22E+03	1.35E+03	5.00E+01	7.29E+01	1.00E+02	4.74E+04	7/108	4/108	0/108
Metals	Chromium	mg/kg	141/142	0/142	45/142	1.05E-02	8.81E+02	4.50E+03	1.58E+01	5.00E-03	2.12E+00	2.50E+00	3.15E+04	42/142	25/142	9/142
Metals	Cobalt	mg/kg	97/111	1/111	48/111	1.30E+00	7.96E+00	7.48E+00	5.48E+00	2.00E-02	2.26E+00	1.02E+01	3.10E+01	17/111	1/111	0/111
Metals	Copper	mg/kg	106/111	0/111	32/111	1.49E-02	3.76E+01	1.07E+02	9.77E+00	5.00E-03	2.85E+00	9.60E+00	6.07E+02	18/111	11/111	6/111
Metals	Iron	mg/kg	110/110	0/110	27/110	1.87E+01	1.72E+04	1.58E+04	1.48E+04	5.00E+00	1.24E+01	5.00E+01	1.32E+05	9/110	2/110	0/110
Metals	Lead	mg/kg	97/139	0/139	42/139	1.02E-02	2.06E+01	5.40E+01	1.00E+01	2.00E-03	1.95E+01	2.00E+01	5.83E+02	19/139	5/139	1/139
Metals	Lithium	mg/kg	28/32	0/32	13/32	6.00E-01	3.97E+01	1.75E+02	8.70E+00	2.00E+00	2.00E+00	2.00E+00	1.55E+01	NA	NA	NA
Metals	Magnesium	mg/kg	108/108	0/108	24/108	1.11E+00	1.15E+03	9.94E+02	8.88E+02	1.50E+01	1.50E+01	1.50E+01	5.04E+03	9/108	3/108	0/108
Metals	Manganese	mg/kg	107/108	0/108	26/108	6.15E-01	3.77E+02	5.69E+02	1.86E+02	5.00E-03	6.15E+00	3.70E+01	4.27E+03	9/108	3/108	0/108
Metals	Mercury	mg/kg	9/135	0/135	102/135	3.50E-02	9.42E-01	1.49E-01	1.00E-01	1.00E-04	1.42E-01	1.06E+00	1.34E+00	3/135	2/135	0/135
Metals	Molybdenum	mg/kg	9/28	0/28	9/28	8.00E-01	6.80E+00	1.33E+01	2.50E+00	5.00E+00	5.00E+00	5.00E+00	5.20E+01	NA	NA	NA
Metals	Nickel	mg/kg	103/125	0/125	44/125	3.10E+00	1.87E+01	2.76E+01	1.10E+01	2.10E-02	5.84E+00	1.30E+01	2.20E+02	23/125	10/125	1/125
Metals	Niobium	mg/kg	3/19	0/19	0/19	6.00E-01	1.43E+01	4.62E+01	6.00E-01				4.80E+01	NA	NA	NA
Metals	Phosphorous	mg/kg	6/7	1/7	0/7	1.58E+02	8.82E+02	1.38E+03	4.00E+02				6.10E+02	NA	NA	NA
Metals	Potassium	mg/kg	96/108	0/108	41/108	7.65E+01	7.44E+02	1.47E+03	5.19E+02	7.32E-01	2.81E+02	1.47E+03	3.36E+03	18/108	1/108	0/108
Metals	Ruthenium	mg/kg	5/11	0/11	0/11	1.55E+01	4.08E+01	8.69E+01	1.55E+01				4.69E+01	NA	NA	NA
Metals	Selenium	mg/kg	15/117	0/117	90/117	9.00E-02	3.70E-01	6.16E-01	2.50E-01	7.00E-04	6.66E-01	3.91E+00	6.40E+00	1/117	1/117	0/117
Metals	Silicon	mg/kg	18/28	0/28	9/28	3.24E+01	3.86E+03	1.88E+04	2.50E+02	5.00E+02	5.00E+02	5.00E+02	1.00E+05	NA	NA	NA
Metals	Silver	mg/kg	18/136	0/136	100/136	1.10E+00	3.14E+00	1.65E+01	1.80E+00	5.00E-03	2.43E+00	9.02E+00	1.92E+02	10/136	8/136	1/136
Metals	Sodium	mg/kg	76/111	0/111	41/111	1.21E-01	2.80E+02	5.89E+02	1.50E+02	1.16E+02	2.36E+02	3.70E+02	4.58E+03	9/111	6/111	2/111
Metals	Strontrium	mg/kg	31/32	0/32	13/32	2.68E+00	3.04E+01	3.45E+01	1.79E+01	2.00E+00	2.00E+00	2.00E+00	1.24E+02	NA	NA	NA
Metals	Tantalum	mg/kg	7/18	0/18	0/18	2.00E+00	1.26E+02	3.54E+02	7.60E+00				1.47E+03	NA	NA	NA
Metals	Thallium	mg/kg	11/111	0/111	84/111	1.80E-01	5.84E+00	1.65E+01	3.50E-01	5.00E-04	6.13E+00	2.00E+01	1.20E+02	3/111	3/111	3/111
Metals	Thorium	mg/kg	11/17	0/17	0/17	9.00E-01	7.38E+00	6.30E+00	5.40E+00				1.76E+01	NA	NA	NA
Metals	Tin	mg/kg	3/19	0/19	0/19	3.20E+00	1.33E+01	3.45E+01	1.60E+00				1.40E+01	NA	NA	NA
Metals	Titanium	mg/kg	17/19	0/19	0/19	3.33E+01	3.66E+02	6.50E+02	2.80E+02				3.00E+03	NA	NA	NA
Metals	Tungsten	mg/kg	8/19	0/19	0/19	1.60E+01	1.24E+02	2.47E+02	1.68E+01				3.94E+02	NA	NA	NA
Metals	Vanadium	mg/kg	99/111	0/111	30/111	2.39E-02	2.19E+01	1.47E+01	2.04E+01	5.00E-03	2.44E+00	7.21E+00	8.11E+01	11/111	2/111	0/111
Metals	Zinc	mg/kg	113/118	0/118	33/118	2.94E-02	2.58E+02	1.01E+03	3.62E+01	1.00E-02	1.70E+01	2.00E+01	6.85E+03	21/118	12/118	5/118
Metals	Zirconium	mg/kg	14/19	0/19	0/19	3.40E+00	1.64E+01	2.23E+01	1.08E+01				4.10E+01	NA	NA	NA
Other Organics	4,4'-DDT	mg/kg	3/70	1/70	70/70	5.20E-02	1.25E-01	7.07E-01	4.98E-03	1.20E-04	2.46E-01	1.10E+01	1.70E-01	NA	NA	NA
Other Organics	Heptachloro-dibenz[b,e][1,4]dioxin	mg/kg	1/2	0/2	1/2	2.80E-03	1.43E-03	1.94E-03	1.43E-03	1.00E-04	1.00E-04	1.00E-04	2.80E-03	NA	NA	NA
Other Organics	Heptachlorodibenzofuran	mg/kg	1/2	0/2	1/2	1.40E-03	7.25E-04	9.55E-04	7.25E-04	1.00E-04	1.00E-04	1.00E-04	1.40E-03	NA	NA	NA
Other Organics	Hexachlorodibenzofuran	mg/kg	1/2	0/2	1/2	3.00E-04	1.75E-04	1.77E-04	1.75E-04	1.00E-04	1.00E-04	1.00E-04	3.00E-04	NA	NA	NA
Other Organics	Octachloro-dibenzo[b,e][1,4]dioxin	mg/kg	2/2	0/2	2/2	2.10E-03	1.31E-02	1.55E-02	1.31E-02				2.40E-02	NA	NA	NA
Other Organics	Octachlorodibenzofuran	mg/kg	2/2	0/2	2/2	5.00E-05	1.28E-03	1.73E-03	1.28E-03				2.50E-03	NA	NA	NA
Other Organics	PCB-1242	mg/kg	3/105	0/105	105/105	2.00E-01	4.43E-01	2.92E+00	4.95E-02	6.10E-04	8.61E-01	5.60E+01	9.00E-01	NA	NA	NA
Other Organics	PCB-1248	mg/kg	8/105	1/105	103/105	2.90E-01	5.93E-01	3.33E+00	4.95E-02	6.10E-04	1.25E-01	1.30E+00	2.90E+01	NA	NA	NA
Other Organics	PCB-1254	mg/kg	10/106	0/106	105/106	2.00E-01	9.28E-01	5.78E+00	5.00E-02	1.21E-03	1.68E+00	1.10E+02	5.50E+00	NA	NA	NA
Other Organics	PCB-1260	mg/kg	13/105	4/105	101/105	7.00E-02	3.47E-01	1.41E+00	5.00E-02	1.21E-03	1.73E-01	1.60E+00	1.25E+01	NA	NA	NA
Other Organics	Polychlorinated biphenyl	mg/kg	25/71	0/71	32/71	2.00E-01	1.88E+01	6.42E+01	2.00E-01	1.00E-01	2.69E-01	1.30E+00	1.80E+01	NA	NA	NA
Radionuclides	Actinium-228	pCi/g	16/19	0/19	19/19	4.13E-01	1.08E+00	1.23E+00	6.40E-01	7.10E-02	1.66E-01	9.48E-01	5.05E+00	NA	NA	NA
Radionuclides	Alpha activity	pCi/g	120/123	12/123	111/123	4.00E-01	5.95E+01	1.94E+02	7.38E+00	1.00E-01	4.65E+00	4.11E+01	1.38E+03	NA	NA	NA
Radionuclides	Americium-241	pCi/g	6/54	0/54	54/54	3.15E-01	1.55E+00	2.12E+00	1.87E-01	1.00E-02	2.43E+00	1.10E+01	9.43E+00	NA	NA	NA
Radionuclides	Beta activity	pCi/g	120/123	12/123	111/123	5.00E-01	8.98E+01	2.59E+02	1.27E+01	1.00E-01	4.77E+00	1.00E+02	2.00E+03	NA	NA	NA
Radionuclides	Beta/Gamma Activity	pCi/g	5/5	0/5	0/5	4.00E+01	6.00E+01	2.45E+01	6.00E+01				1.00E+02	NA	NA	NA
Radionuclides	Bismuth-212	pCi/g	17/19	0/19	19/19	1.60E-01	9.43E-01	1.22E+00	5.11E-01	1.10E-01	3.46E-01	1.83E+00	4.71E+00	NA	NA	NA
Radionuclides	Bismuth-214	pCi/g	18/19	0/19	19/19	3.90E-01	1.44E+00	1.78E+00	6.70E-01	3.10E-02	8.23E-02	4.03E-01	6.61E+00	NA	NA	NA
Radionuclides	Cesium-137	pCi/g	39/67	0/67	46/67	1.20E-02	6.72E-01	1.53E+00	3.70E-01	1.37E-02	5.62E-01	3.30E+00	1.09E+01	16/67	10/67	2/67
Radionuclides	Cobalt-60	pCi/g	4/49	0/49	45/49	-2.70E-03	3.33E-01	5.76E-01	9.95E-03	1.31E-02	7.61E-01	5.50E+00	2.97E-02	NA	NA	NA

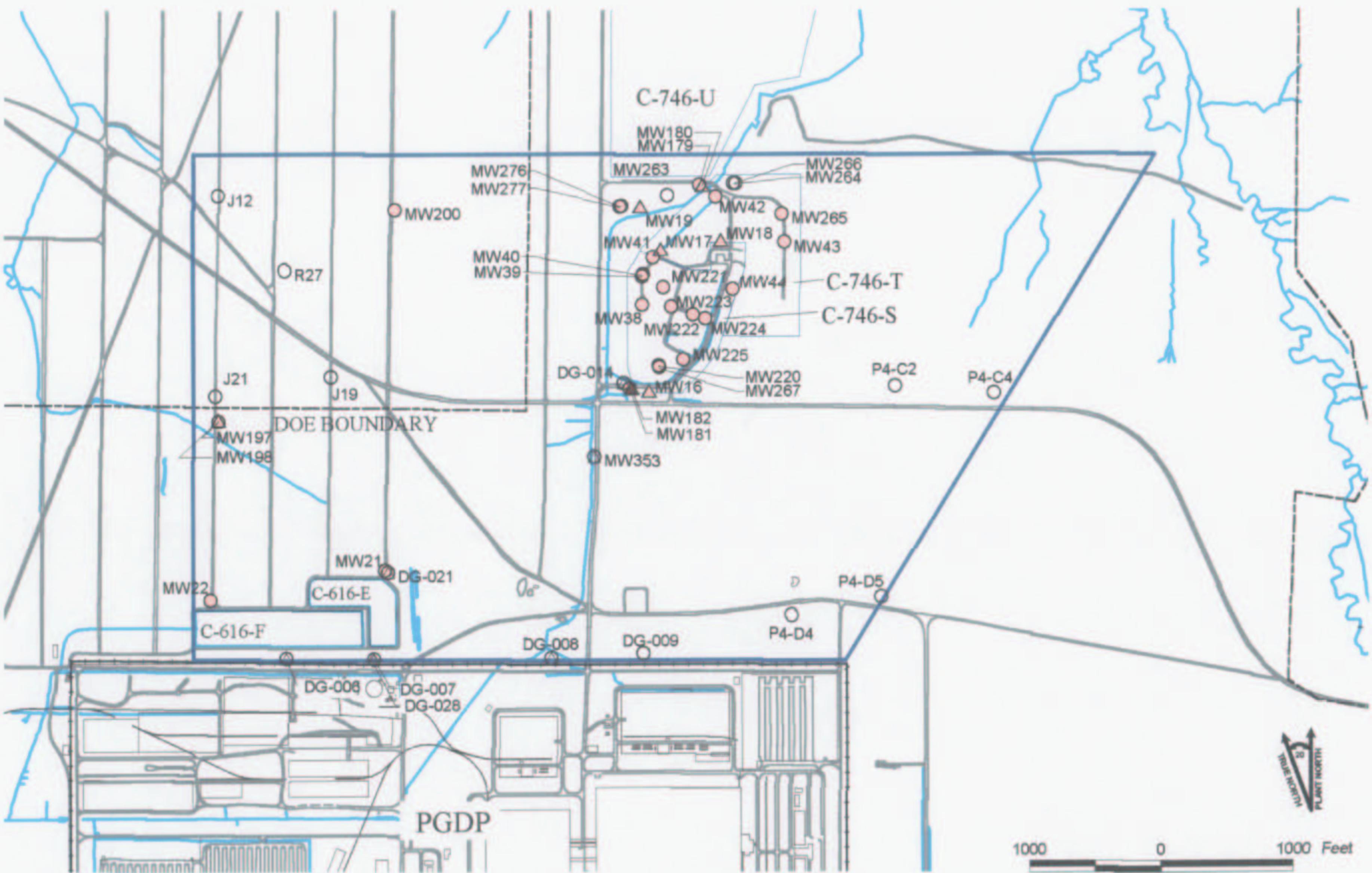
**Table A.4. Summary Statistics for Analytes Detected in Soil.**

Analysis Type	Analyte	Units	Proportion Detected	Prop. "J" Det.	Freq. of MDL	Min. Detect	Arithmetic Mean	Std. Dev.	Median Result	Min. MDL	Avg. MDL	Max. MDL	Max. Detect	FOD above 1X Bkgd.	FOD above 2X Bkgd.	FOD above 10X Bkgd.
Radionuclides	Lead-210	pCi/g	1/19	0/19	19/19	2.65E+00	2.31E-01	9.25E-01	1.53E-01	1.28E+00	5.85E+00	3.10E+01	2.65E+00	NA	NA	NA
Radionuclides	Lead-212	pCi/g	17/19	0/19	19/19	2.26E-01	9.58E-01	1.22E+00	4.82E-01	3.44E-02	7.18E-02	3.29E-01	4.63E+00	NA	NA	NA
Radionuclides	Lead-214	pCi/g	17/19	0/19	19/19	3.40E-01	1.47E+00	1.91E+00	6.70E-01	3.70E-02	8.57E-02	4.32E-01	7.35E+00	NA	NA	NA
Radionuclides	Neptunium-237	pCi/g	40/90	0/90	57/90	-1.40E-02	2.76E+00	7.27E+00	3.48E-02	8.00E-03	7.04E-01	5.00E+00	4.32E+01	24/90	22/90	17/90
Radionuclides	Plutonium-238	pCi/g	3/31	0/31	31/31	1.20E-01	3.42E-02	1.48E-01	-2.57E-03	8.00E-03	1.82E-01	3.17E-01	5.76E-01	3/31	2/31	0/31
Radionuclides	Plutonium-239	pCi/g	35/46	1/46	13/46	-9.00E-03	9.98E+00	3.71E+01	5.50E-02	1.00E-02	9.57E+00	1.20E+02	2.40E+02	23/46	19/46	16/46
Radionuclides	Plutonium-239/240	pCi/g	10/37	0/37	37/37	3.01E-02	3.06E+00	9.16E+00	8.72E-03	5.31E-03	1.96E-01	2.07E+00	4.16E+01	NA	NA	NA
Radionuclides	Potassium-40	pCi/g	42/43	0/43	22/43	9.00E-01	9.13E+00	7.80E+00	8.31E+00	1.05E-01	5.25E-01	3.93E+00	5.22E+01	2/43	1/43	0/43
Radionuclides	Protactinium-231	pCi/g	11/19	0/19	19/19	2.16E-01	9.26E-01	1.07E+00	6.07E-01	1.54E-01	4.73E-01	1.70E+00	2.65E+00	NA	NA	NA
Radionuclides	Protactinium-233	pCi/g	4/19	0/19	19/19	1.37E-01	1.77E-01	4.90E-01	1.20E-02	4.20E-02	9.72E-02	4.87E-01	2.12E+00	NA	NA	NA
Radionuclides	Protactinium-234m	pCi/g	12/47	0/47	47/47	6.51E-01	5.61E+01	7.71E+01	4.20E+01	3.18E-01	9.10E+01	7.10E+02	2.60E+02	NA	NA	NA
Radionuclides	Radium-223	pCi/g	3/19	0/19	19/19	5.28E-01	3.52E-01	6.49E-01	1.18E-01	7.70E-02	2.52E-01	1.36E+00	2.81E+00	NA	NA	NA
Radionuclides	Radium-226	pCi/g	1/19	0/19	19/19	1.60E-01	7.09E-01	8.85E-01	3.25E-01	7.30E-02	2.53E-01	1.39E+00	1.60E-01	0/19	0/19	0/19
Radionuclides	Radium-228	pCi/g	2/19	0/19	19/19	2.10E-01	7.31E-01	9.51E-01	3.65E-01	5.70E-02	4.34E-01	2.16E-00	3.32E-01	NA	NA	NA
Radionuclides	Strontrium-90	pCi/g	6/18	0/18	18/18	1.30E+00	1.14E+00	1.69E+00	2.50E+01	9.81E-01	4.00E+00	5.00E+00	0/18	0/18	0/18	
Radionuclides	Technetium-99	mg/kg	76/123	6/123	68/123	3.50E-02	1.81E+02	6.52E+02	9.00E-01	1.10E-01	1.01E+01	1.00E+02	4.70E+03	50/123	40/123	30/123
Radionuclides	Technetium-99	mg/kg	76/123	6/123	68/123	5.40E-03	7.19E-03	5.99E-03	9.00E-01				3.00E-02	50/123	40/123	30/123
Radionuclides	Technetium-99	pCi/g	76/123	6/123	68/123	3.50E-02	1.81E+02	6.52E+02	9.00E-01	1.10E-01	1.01E+01	1.00E+02	4.70E+03	50/123	40/123	30/123
Radionuclides	Technetium-99	pCi/g	76/123	6/123	68/123	5.40E-03	7.19E-03	5.99E-03	9.00E-01				3.00E-02	50/123	40/123	30/123
Radionuclides	Thallium-208	pCi/g	9/19	0/19	19/19	9.90E-02	2.61E-01	2.87E-01	1.72E-01	2.00E-02	7.88E-02	5.84E-01	3.46E-01	NA	NA	NA
Radionuclides	Thorium-228	pCi/g	23/38	0/38	38/38	1.70E-01	6.34E-01	8.65E-01	3.13E-01	3.20E-02	1.18E-01	8.79E-01	3.72E+00	2/38	2/38	0/38
Radionuclides	Thorium-230	pCi/g	68/71	5/71	38/71	4.30E-03	4.51E-01	1.16E+02	9.40E-01	1.00E-04	1.54E+00	1.00E+01	5.94E+02	31/71	27/71	20/71
Radionuclides	Thorium-232	pCi/g	27/38	0/38	38/38	6.51E-02	5.11E-01	8.00E-01	2.63E-01	2.10E-02	7.74E-02	2.54E-01	4.20E+00	8/38	2/38	0/38
Radionuclides	Thorium-234	pCi/g	20/48	0/48	48/48	6.51E-01	1.36E+01	3.80E+01	5.67E+00	2.95E-01	4.65E+01	2.50E+01	2.60E+02	NA	NA	NA
Radionuclides	Uranium	mg/kg	75/88	0/88	44/88	4.97E+00	6.11E+01	1.26E+02	1.90E+01	3.60E+01	3.05E+00	8.81E+00	5.93E+02	40/88	36/88	18/88
Radionuclides	Uranium	pCi/g	75/88	0/88	44/88	1.60E-01	8.71E+01	3.69E+02	1.90E+01	2.60E-02	1.86E+01	2.00E+02	3.11E+02	40/88	36/88	18/88
Radionuclides	Uranium	pCi/g	75/88	0/88	44/88	4.97E+00	6.11E+01	1.26E+02	1.90E+01	3.60E-01	3.05E+00	8.81E+00	5.93E+02	40/88	36/88	18/88
Radionuclides	Uranium	mg/kg	75/88	0/88	44/88	1.60E-01	8.71E+01	3.69E+02	1.90E+01	2.60E-02	1.86E+01	2.00E+02	3.11E+02	40/88	36/88	18/88
Radionuclides	Uranium-233/234	pCi/g	5/5	0/5	5/5	6.00E-01	1.57E+00	1.76E+00	8.10E-01	2.40E-02	5.64E-02	7.20E-02	4.70E+00	NA	NA	NA
Radionuclides	Uranium-234	pCi/g	65/74	3/74	55/74	7.00E-02	1.59E+01	3.55E+01	2.99E+00	4.81E-03	7.83E-01	1.00E+01	2.54E+02	38/74	32/74	13/74
Radionuclides	Uranium-235	pCi/g	47/69	1/69	55/69	1.30E-02	1.62E+00	2.30E+00	3.90E-01	5.93E-03	2.25E+00	9.40E+00	1.20E+01	27/69	18/69	8/69
Radionuclides	Uranium-238	pCi/g	72/79	5/79	60/79	5.00E-02	2.73E+01	5.91E+01	6.50E+00	3.94E-03	7.90E-01	4.61E+00	3.26E+02	52/79	46/79	28/79
Semivolatile	1,2-Dichlorobenzene	mg/kg	2/82	2/82	82/82	6.40E-02	2.52E-01	2.00E-01	3.50E-01	5.11E-01	3.70E+00	1.00E-01	NA	NA	NA	
Semivolatile	2-Methylnaphthalene	mg/kg	2/85	2/85	85/85	6.80E+02	1.87E+01	1.11E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	7.60E+02	NA	NA	NA
Semivolatile	2-Pentene, 3,4-dimethyl-, (Z)-	mg/kg	1/1	1/1	0/1	2.40E-01	2.40E-01	2.40E-01					2.40E-01	NA	NA	NA
Semivolatile	6-(Acetoxy)-2-hexanone	mg/kg	3/3	3/3	0/3	2.10E-01	5.50E+00	8.24E+00	1.30E+00				1.50E+01	NA	NA	NA
Semivolatile	Acenaphthene	mg/kg	3/85	2/85	85/85	1.30E+03	8.38E+01	4.63E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	3.10E+03	NA	NA	NA
Semivolatile	Anthracene	mg/kg	3/85	2/85	85/85	1.70E+03	1.11E+02	6.16E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	4.30E+03	NA	NA	NA
Semivolatile	Benz(a)anthracene	mg/kg	6/85	5/85	85/85	2.00E-01	1.66E+02	9.07E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	6.40E+03	NA	NA	NA
Semivolatile	Benz(a)pyrene	mg/kg	5/85	4/85	85/85	1.80E-01	1.59E+02	8.67E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	6.10E+03	NA	NA	NA
Semivolatile	Benzo(b)fluoranthene	mg/kg	7/85	6/85	85/85	5.60E-02	1.68E+02	9.20E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	6.60E+03	NA	NA	NA
Semivolatile	Benzo(ghi)perylene	mg/kg	3/72	2/72	72/72	1.50E+03	9.19E-01	4.67E+02	1.98E-01	3.50E-01	1.70E-01	4.90E+02	3.20E+03	NA	NA	NA
Semivolatile	Benzo(k)fluoranthene	mg/kg	5/85	4/85	85/85	4.80E-02	1.00E+02	5.48E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	3.80E+03	NA	NA	NA
Semivolatile	Bi-2-cyclohexen-1-yl	mg/kg	1/1	1/1	0/1	2.30E-01	2.30E-01	2.30E-01					2.30E-01	NA	NA	NA
Semivolatile	Bis(2-ethylhexyl)phthalate	mg/kg	24/81	13/81	75/81	4.90E-02	4.21E-01	7.04E-02	2.25E-01	6.50E-02	5.08E-01	3.70E+00	5.00E+00	NA	NA	NA
Semivolatile	Butyl benzyl phthalate	mg/kg	1/69	0/69	69/69	1.90E+00	2.76E-01	3.35E-01	1.95E-01	3.50E-01	5.14E-01	3.70E+00	1.90E+00	NA	NA	NA
Semivolatile	Carbazole	mg/kg	3/18	2/18	18/18	1.30E+03	3.56E+02	8.63E+02	2.50E-01	4.50E-01	6.65E+01	4.90E+02	2.90E+03	NA	NA	NA
Semivolatile	Carbazole	"	3/18	2/18	18/18	1.30E+03	3.56E+02	8.63E+02	2.50E-01	4.50E-01	6.65E+01	4.90E+02	2.90E+03	NA	NA	NA
Semivolatile	Chrysene	mg/kg	6/85	5/85	85/85	2.00E-01	1.63E+02	8.85E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	6.20E+03	NA	NA	NA
Semivolatile	Di-n-butyl phthalate	mg/kg	7/82	4/82	82/82	1.10E-01	3.39E-01	9.56E-01	2.00E-01	3.50E-01	5.11E-01	3.70E+00	8.80E+00	NA	NA	NA
Semivolatile	Dibenz(a,h)anthracene	mg/kg	3/85	2/85	85/85	3.60E+02	2.13E+01	1.20E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	9.40E+02	NA	NA	NA
Semivolatile	Dibenzofuran	mg/kg	3/85	2/85	85/85	5.70E+02	4.22E+01	2.36E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	1.50E+03	NA	NA	NA
Semivolatile	Ethanol, 2,2'-oxybis-, diacetate	mg/kg	9/9	9/9	0/9	3.30E-01	1.23E+00	7.62E-01	1.10E+00				2.40E+00	NA	NA	NA
Semivolatile	Fluoranthene	mg/kg	9/85	6/85	85/85	5.50E-02	3.93E+02	2.15E+03	2.00E-01	3.50E-01	2.85E+01	9.80E+02	1.50E+04	NA	NA	NA
Semivolatile	Fluorene	mg/kg	3/85	2/85	85/85	1.20E+03	8.02E+01	4.45E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	3.00E+03	NA	NA	NA
Semivolatile	Hexanedioic acid, mono(2-ethylhexyl) ester	mg/kg	1/1	1/1	0/1	2.80E+01	2.80E+01	2.80E+01					2.80E+01	NA	NA	NA
Semivolatile	Indeno(1,2,3-cd)pyrene	mg/kg	4/85	3/85	85/85	1.70E-01	9.20E+01	5.06E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	3.70E+03	NA	NA	NA
Semivolatile	n-lauroylsarcosine	mg/kg	3/3	3/3	0/3	2.10E-01	2.20E-01	1.00E-02	2.20E-01				2.30E-01	NA	NA	NA
Semivolatile	N-Nitrosodiphenylamine	mg/kg	2/82	2/82	82/82	6.40E-02	2.52E-01	2.52E-01	2.00E-01	3.50E-01	5.11E-01	3.70E+00	7.10E-02	NA	NA	NA

**Table A.4. Summary Statistics for Analytes Detected in Soil.**

Analysis Type	Analyte	Units	Proportion Detected	Prop. "J" Det.	Freq. of MDL	Min. Detect	Arithmetic Mean	Std. Dev.	Median Result	Min. MDL	Avg. MDL	Max. MDL	Max. Detect	FOD above 1X Bkgd.	FOD above 2X Bkgd.	FOD above 10X Bkgd.
Semivolatiles	Naphthalene	mg/kg	3/85	2/85	85/85	4.30E+02	3.47E+01	1.99E+02	2.00E-01	3.50E-01	1.45E+01	4.90E+02	1.50E+03	NA	NA	NA
Semivolatiles	Phenanthrene	mg/kg	6/85	5/85	85/85	3.90E-01	4.11E+02	2.27E+03	2.00E-01	3.50E-01	2.85E+01	9.80E+02	1.60E+04	NA	NA	NA
Semivolatiles	Pyrene	mg/kg	7/85	5/85	85/85	8.30E-02	2.78E+02	1.53E+03	2.00E-01	3.50E-01	2.03E+01	9.80E+02	1.10E+04	NA	NA	NA
Volatiles	1,1,2,2-Tetrachloroethane	mg/kg	1/104	1/104	103/104	1.90E-01	2.32E-02	1.02E-01	3.00E-03	5.00E-03	4.31E-02	1.20E+00	1.90E-01	NA	NA	NA
Volatiles	1,1,2-Trichloro-1,2,2-trifluoroethane	mg/kg	8/8	8/8	0/8	8.40E-03	1.19E-02	4.24E-03	1.00E-02				2.00E-02	NA	NA	NA
Volatiles	1,2-Dimethylbenzene	mg/kg	2/29	1/29	29/29	1.50E-02	6.41E-03	5.99E-03	5.00E-03	1.00E-02	1.00E-02	1.00E-02	3.60E-02	NA	NA	NA
Volatiles	2,5-Dimethylheptane	mg/kg	1/1	1/1	0/1	5.30E-01	5.30E-01			5.30E-01			5.30E-01	NA	NA	NA
Volatiles	2-Butanone	mg/kg	5/103	1/103	103/103	6.00E-03	5.09E-02	1.70E-01	6.00E-03	1.00E-02	6.66E-02	1.20E+00	1.30E+00	NA	NA	NA
Volatiles	2-Cyclohexen-1-one	mg/kg	2/2	2/2	0/2	9.10E+00	9.55E+00	6.36E-01	9.55E+00				1.00E+01	NA	NA	NA
Volatiles	4-Heptanone	mg/kg	1/1	1/1	0/1	3.30E-01	3.30E-01			3.30E-01			3.30E-01	NA	NA	NA
Volatiles	4-Hydroxy-4-methyl-2-pentanone	mg/kg	1/1	1/1	0/1	7.40E+00	7.40E+00			7.40E+00			7.40E+00	NA	NA	NA
Volatiles	4-Methyl-2-pentanone	mg/kg	3/103	2/103	103/103	9.00E-03	3.37E-02	1.04E-01	6.00E-03	1.00E-02	6.71E-02	1.20E+00	1.50E-02	NA	NA	NA
Volatiles	4-Methyl-3-penten-2-one	mg/kg	2/2	2/2	0/2	2.20E-01	3.15E-01	1.34E-01	3.15E-01				4.10E-01	NA	NA	NA
Volatiles	Acetaldehyde	mg/kg	8/8	8/8	0/8	6.40E-03	9.45E-03	4.81E-03	7.75E-03				2.10E-02	NA	NA	NA
Volatiles	Acetone	mg/kg	37/102	9/102	92/102	7.00E-03	1.13E-01	4.10E-01	1.82E-02	6.00E-03	7.27E-02	1.20E+00	3.30E+00	NA	NA	NA
Volatiles	Benzene	mg/kg	2/103	2/103	103/103	1.00E-02	2.13E-02	1.01E-01	3.00E-03	5.00E-03	4.31E-02	1.20E+00	1.50E-02	NA	NA	NA
Volatiles	Benzene Derivative	mg/kg	1/1	1/1	0/1	1.00E-01	1.00E-01			1.00E-01			1.00E-01	NA	NA	NA
Volatiles	Carbon disulfide	mg/kg	3/103	1/103	102/103	8.00E-03	2.23E-02	1.01E-01	3.00E-03	5.00E-03	4.30E-02	1.20E+00	1.00E-01	NA	NA	NA
Volatiles	Chlorobenzene	mg/kg	1/103	1/103	103/103	2.00E-03	2.15E-02	1.01E-01	3.00E-03	5.00E-03	4.31E-02	1.20E+00	2.00E-03	NA	NA	NA
Volatiles	Chloroform	mg/kg	1/103	0/103	103/103	1.10E-02	2.16E-02	1.01E-01	3.00E-03	5.00E-03	4.31E-02	1.20E+00	1.10E-02	NA	NA	NA
Volatiles	Diethyl ether	mg/kg	3/3	3/3	0/3	6.60E-03	2.13E-02	2.49E-02	7.20E-03				5.00E-02	NA	NA	NA
Volatiles	Dimethylbenzene	mg/kg	2/74	2/74	74/74	3.00E-03	7.67E-02	3.57E-01	3.00E-03	5.00E-03	1.53E-01	3.60E+00	3.00E-03	NA	NA	NA
Volatiles	Ethybenzene	mg/kg	3/103	1/103	103/103	1.10E-02	2.18E-02	1.01E-01	3.00E-03	5.00E-03	4.31E-02	1.20E+00	1.80E-02	NA	NA	NA
Volatiles	Hexanal	mg/kg	1/1	1/1	0/1	5.40E-03	5.40E-03			5.40E-03			5.40E-03	NA	NA	NA
Volatiles	m,p-Xylene	mg/kg	2/29	1/29	29/29	2.20E-02	1.01E-02	6.67E-03	1.00E-02	1.00E-02	1.72E-02	2.00E-02	4.00E-02	NA	NA	NA
Volatiles	Methylene chloride	mg/kg	32/103	6/103	94/103	3.00E-03	4.73E-02	1.08E-01	5.00E-03	5.00E-03	4.82E-02	1.20E+00	2.40E-01	NA	NA	NA
Volatiles	Toluene	mg/kg	7/103	4/103	103/103	2.00E-03	2.25E-02	1.01E-01	3.00E-03	5.00E-03	4.31E-02	1.20E+00	3.70E-02	NA	NA	NA
Volatiles	Trichloroethene	mg/kg	5/121	0/121	121/121	2.00E-03	4.22E-02	1.09E-01	3.00E-03	1.00E-03	8.36E-02	1.20E+00	3.40E-02	NA	NA	NA

## **APPENDIX B**



**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE  
○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED, > MCL  
> 10% FREQUENCY
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

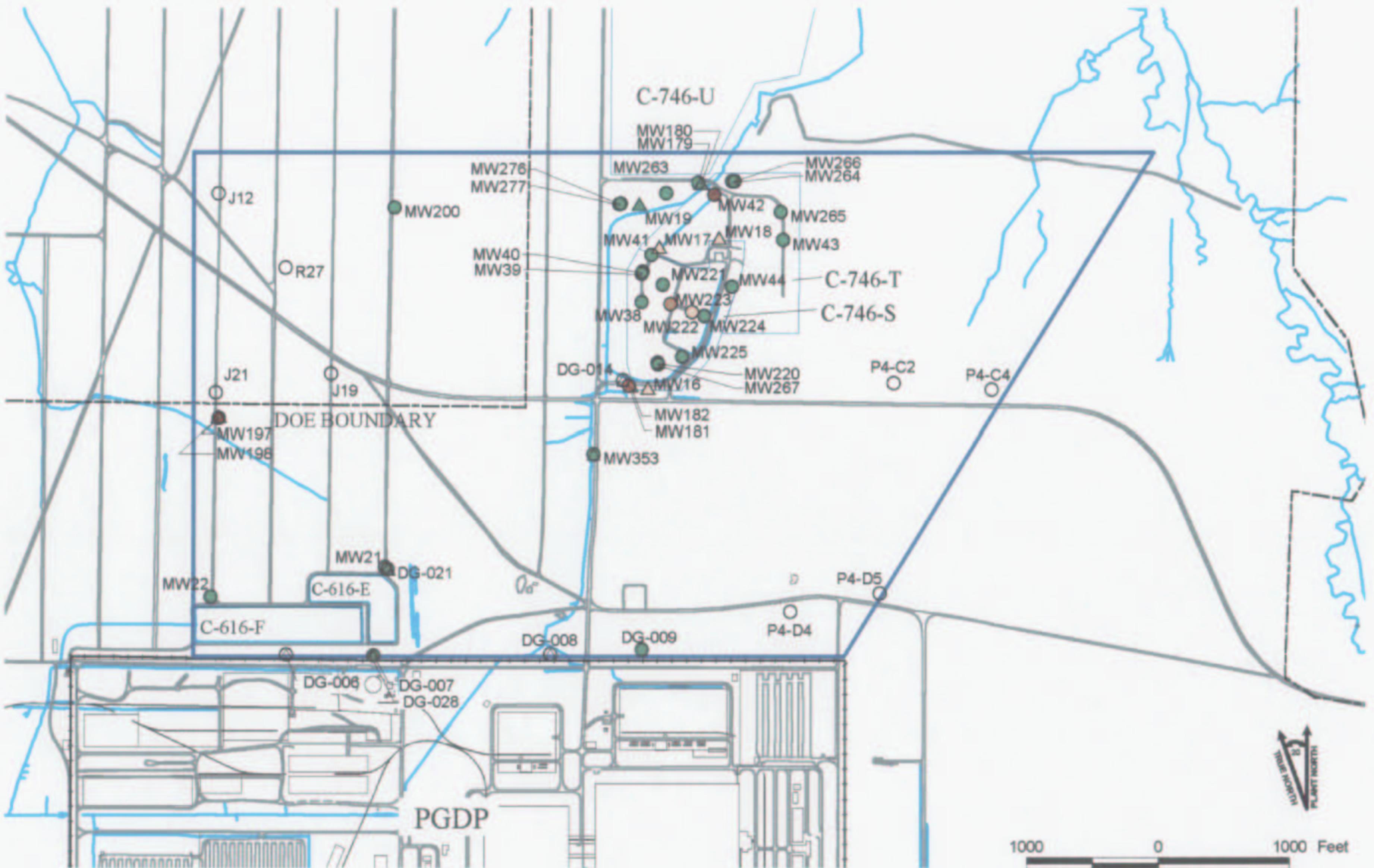
**U.S. DEPARTMENT OF ENERGY**  
DOE OAK RIDGE OPERATIONS  
PADUCAH GASEOUS DIFFUSION PLANT

**BECHTEL JACOBS COMPANY LLC**  
Managed for the US Department of Energy under  
US Government Contract DE-AC-98OR22700  
Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio

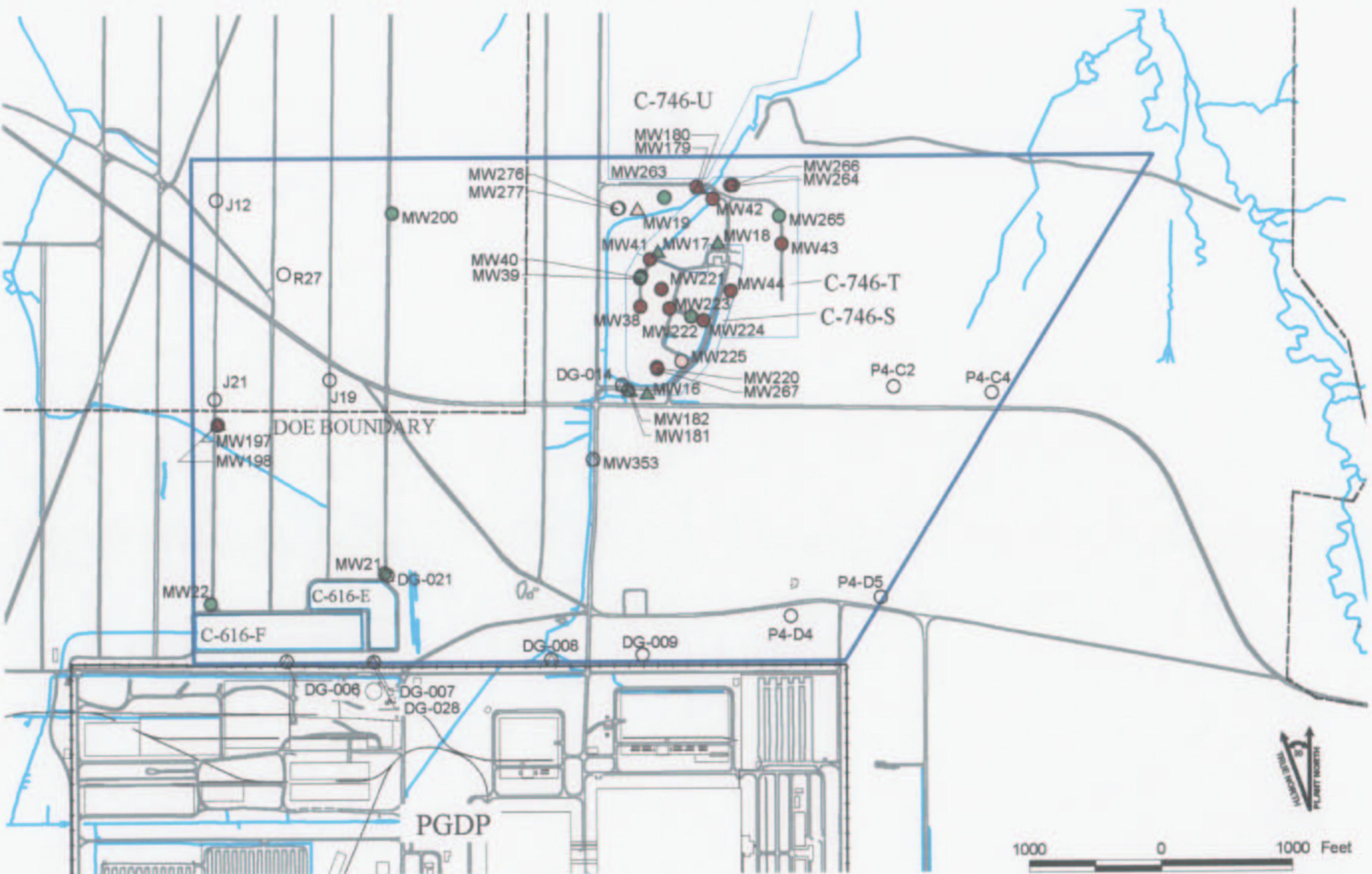


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Fig. B.1. C-746-S&T RI scoping area: fluoride in groundwater.



<b>LEGEND</b> FENCE ROAD STREAM LANDFILL BOUNDARY C-746-S&T RI SCOPING AREA UCRS GROUNDWATER SAMPLE RGA GROUNDWATER SAMPLE <p>NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.</p>	<b>U.S. DEPARTMENT OF ENERGY</b> DOE OAK RIDGE OPERATIONS PADUCAH GASEOUS DIFFUSION PLANT  <b>BECHTEL JACOBS COMPANY LLC</b> MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER US GOVERNMENT CONTRACT DE-AC-98OR22700 Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio
Fig. B.2. C-746-S&T RI scoping area: antimony in groundwater.	 <b>Science Applications International Corporation</b> P.O. Box 2502 Oak Ridge, Tennessee 37831



## LEGEND

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE

○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED, > MCL AT 10 % FOD
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

## U.S. DEPARTMENT OF ENERGY

DOE OAK RIDGE OPERATIONS  
PADUCAH GASEOUS DIFFUSION PLANT

BECHTEL  
JACOBS

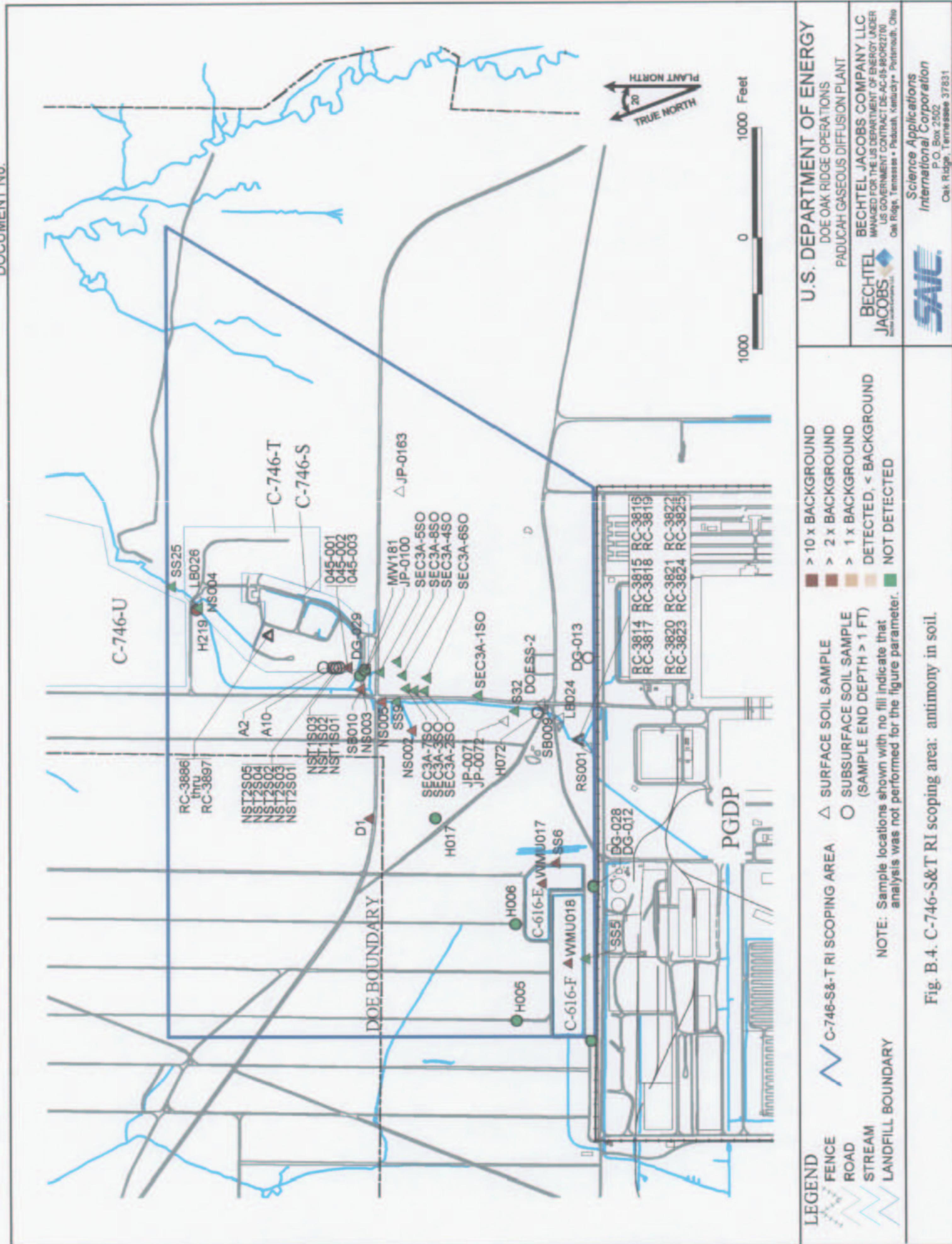
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US GOVERNMENT CONTRACT DE-AC-05-OR22700  
Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio

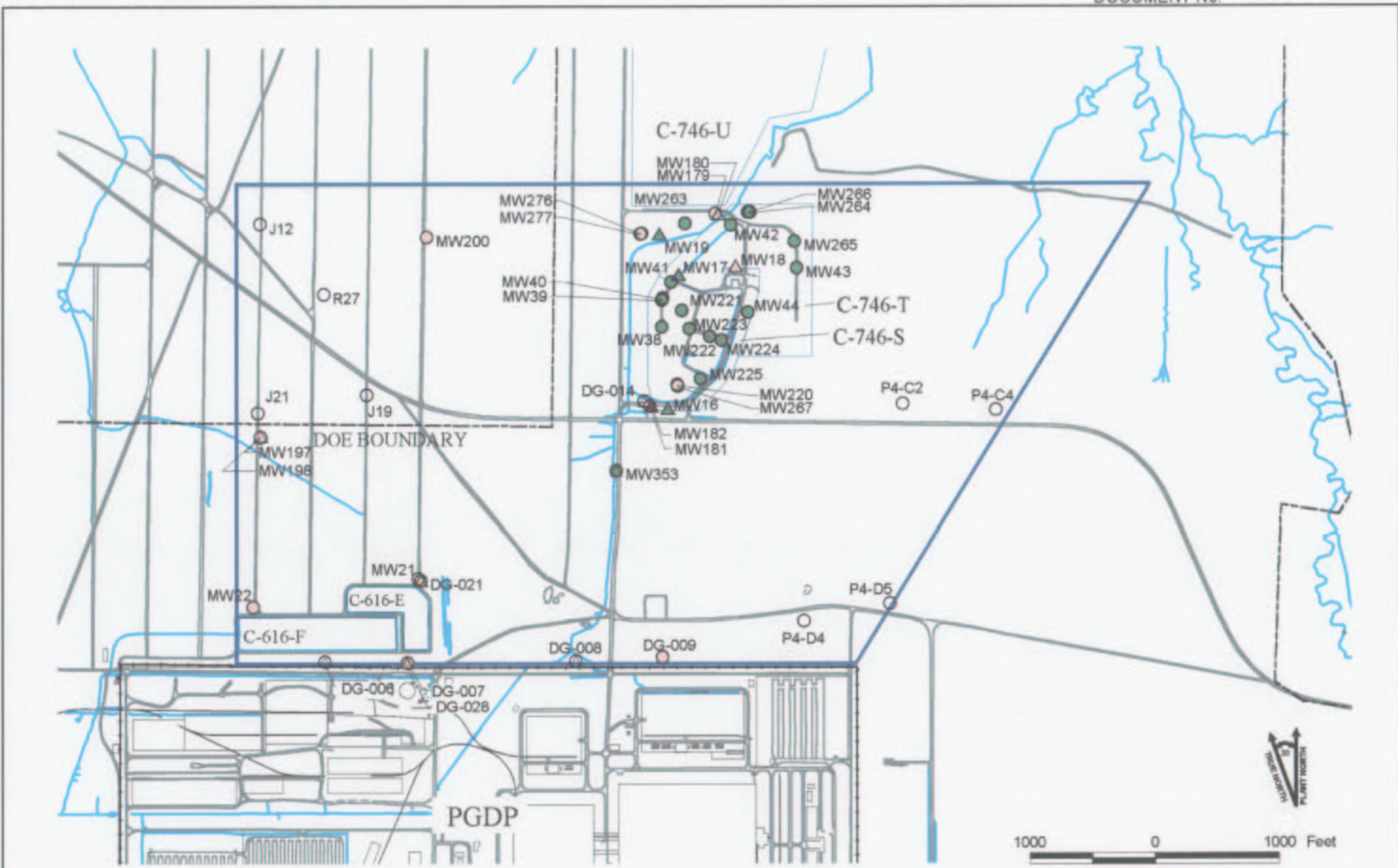
Fig. B.3. C-746-S&T RI scoping area: dissolved antimony in groundwater.



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FIGURE No. c5ac90001sk040.apr  
DATE 08-12-01





**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

**C-746-S&T RI SCOPING AREA**

**△ UCRS GROUNDWATER SAMPLE**

**○ RGA GROUNDWATER SAMPLE**

**NOTE:** Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

**DETECTION STATUS**

- DETECTED, > MCL AT 10 % FOD
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

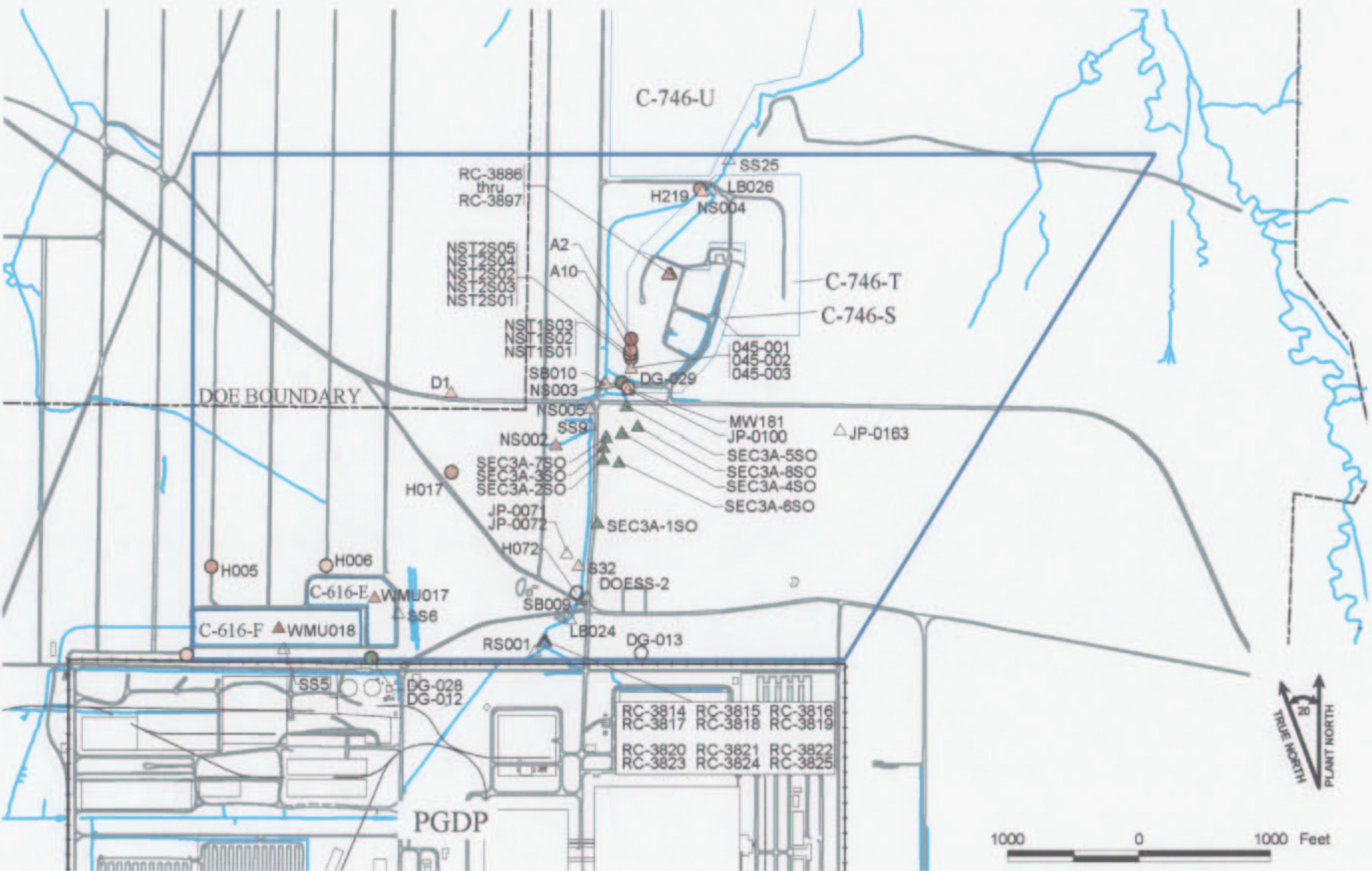
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Fig. B.5. C-746-S&T RI scoping area: arsenic in groundwater.

Fig. B.5. C-746-S&T RI scoping area: arsenic in groundwater.



**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ SURFACE SOIL SAMPLE

○ SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

■ > 10 x BACKGROUND
■ > 2 x BACKGROUND
■ > 1 x BACKGROUND
■ DETECTED, < BACKGROUND
■ NOT DETECTED

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PADUCAH GASEOUS DIFFUSION PLANT

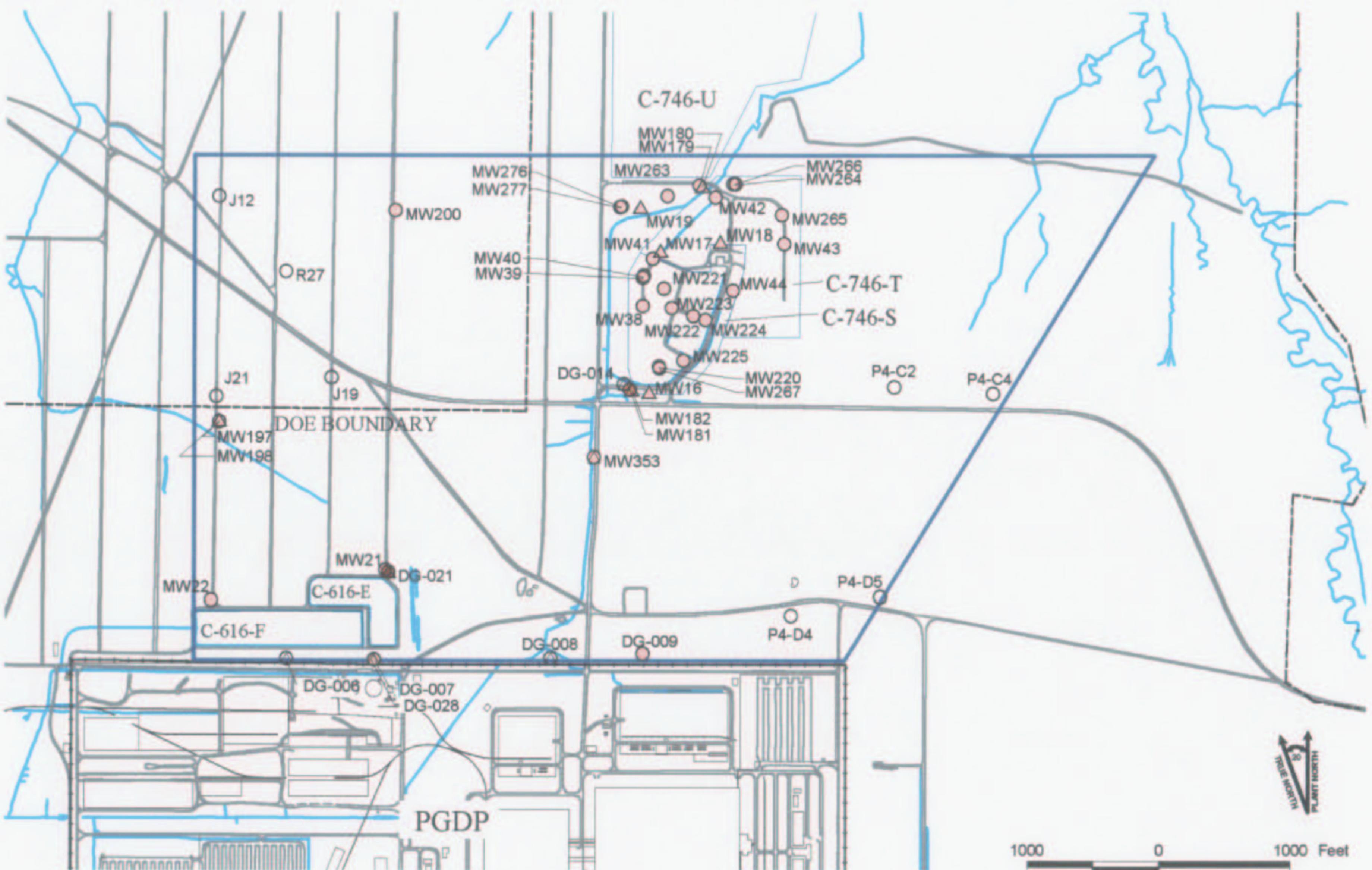
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Fig. B.6. C-746-S&T RI scoping area: arsenic in soil.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UC RS GROUNDWATER SAMPLE  
○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

■	DETECTED, > MCL AT 10 % FOD
■	DETECTED, > MCL
■	DETECTED, < MCL
■	NOT DETECTED

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PADUCAH GASEOUS DIFFUSION PLANT

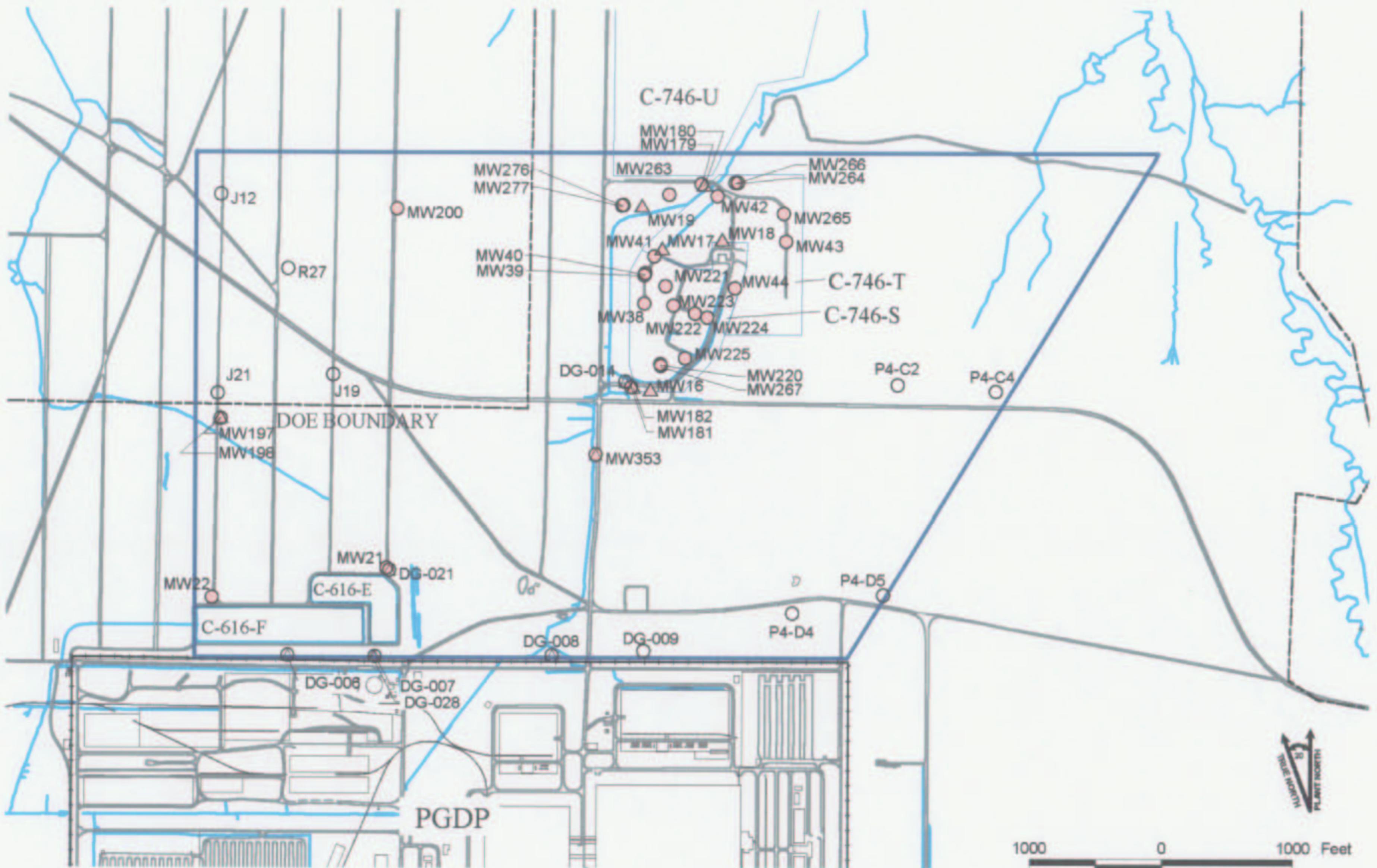
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Fig. B.7. C-746-S&T RI scoping area: barium in groundwater.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE

○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED, > MCL AT 10 % FOD
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

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DOE OAK RIDGE OPERATIONS  
PADUCAH GASEOUS DIFFUSION PLANT

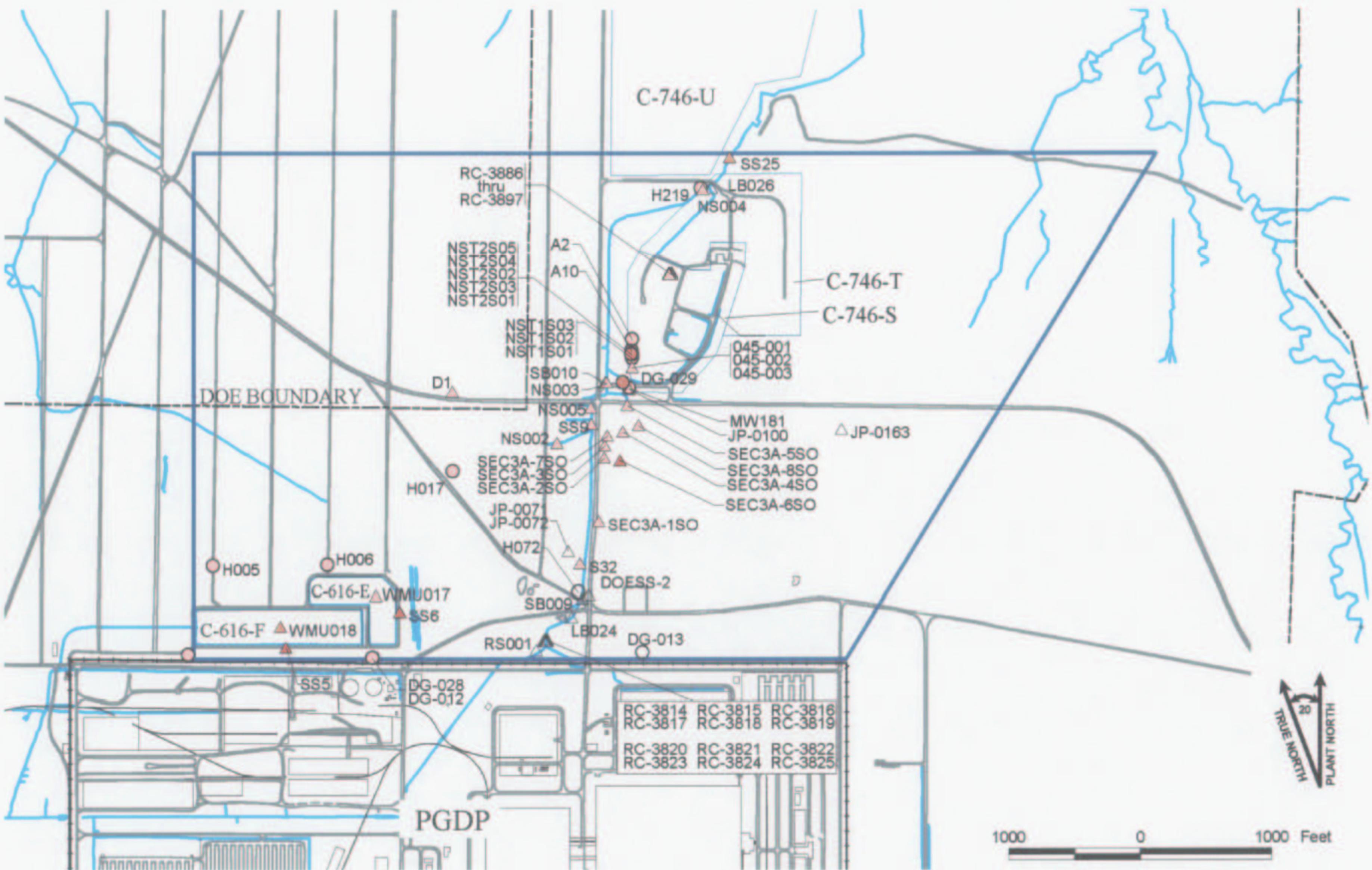
BECHTEL  
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Fig. B.8. C-746-S&T RI scoping area: dissolved barium in groundwater.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

SURFACE SOIL SAMPLE

SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

> 10 x BACKGROUND  
> 2 x BACKGROUND  
> 1 x BACKGROUND  
DETECTED, < BACKGROUND  
NOT DETECTED

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

**U.S. DEPARTMENT OF ENERGY**

DOE OAK RIDGE OPERATIONS  
PADUCAH GASEOUS DIFFUSION PLANT

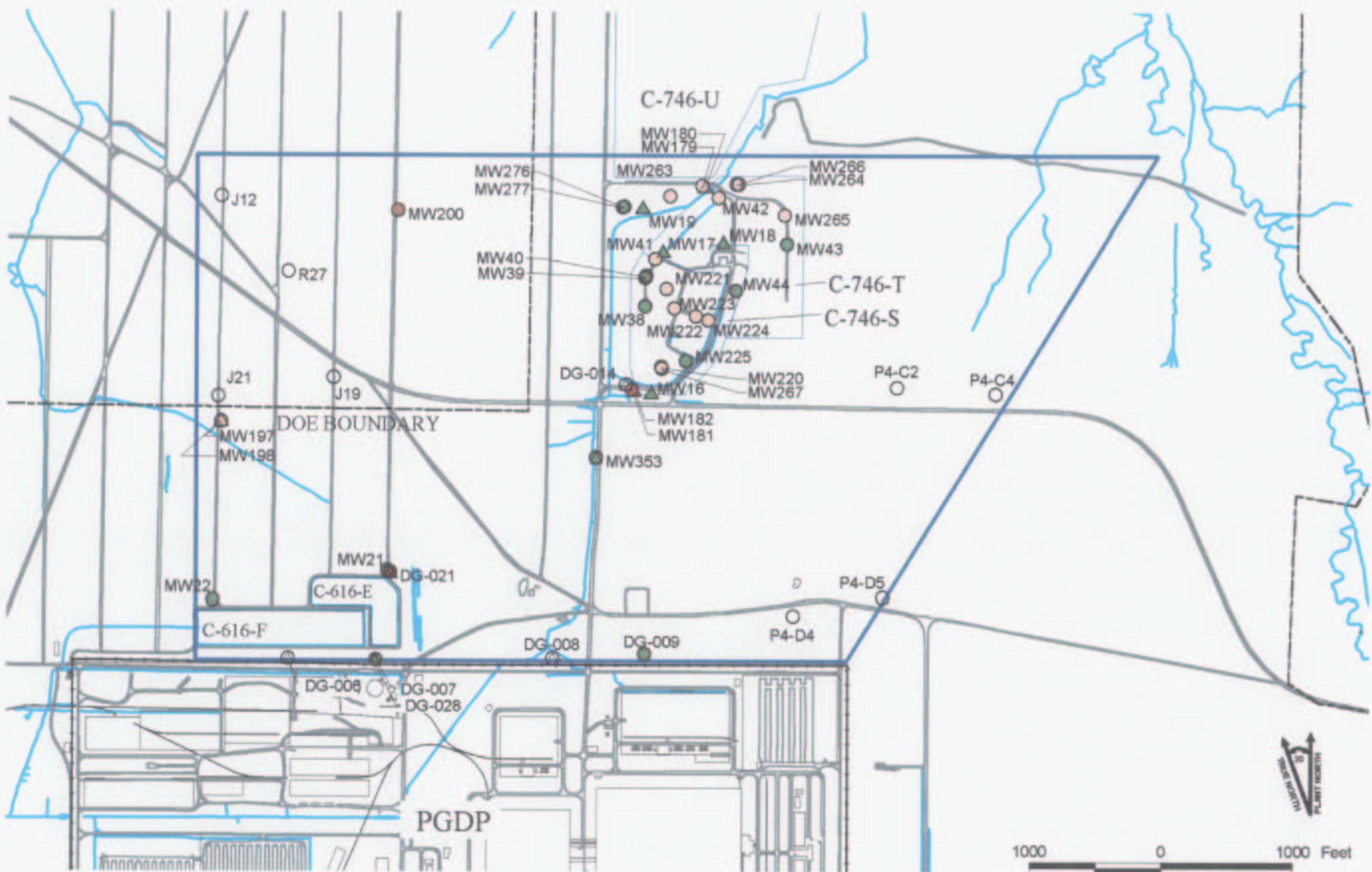
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Fig. B.9. C-746-S&T RI scoping area: barium in soil.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE  
○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED, > MCL AT 10 % FOD
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

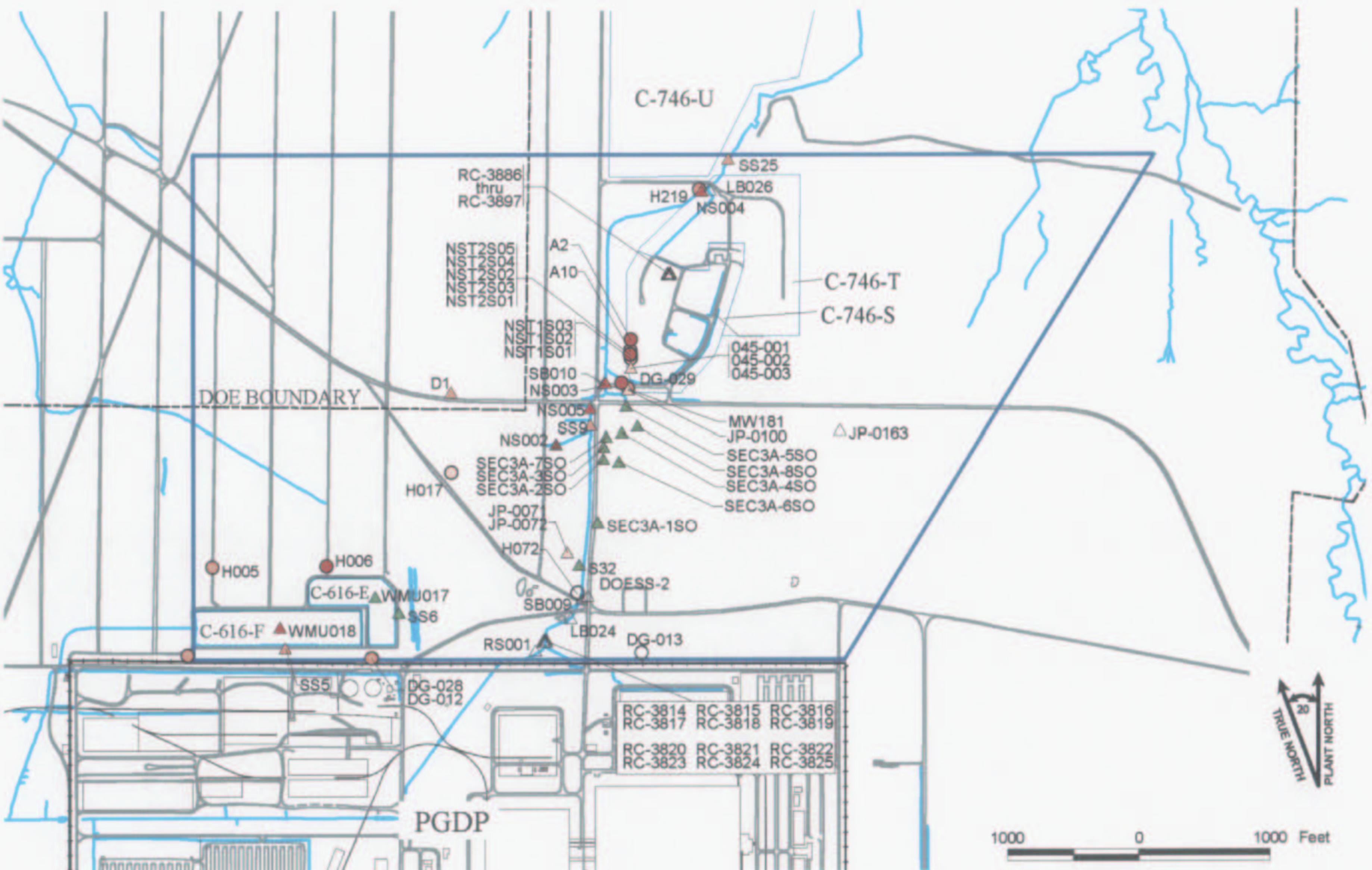
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Fig. B.10. C-746-S&T RI scoping area: beryllium in groundwater.

**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ SURFACE SOIL SAMPLE

○ SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

■ > 10 x BACKGROUND

■ > 2 x BACKGROUND

■ > 1 x BACKGROUND

■ DETECTED, < BACKGROUND

■ NOT DETECTED

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

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PADUCAH GASEOUS DIFFUSION PLANT

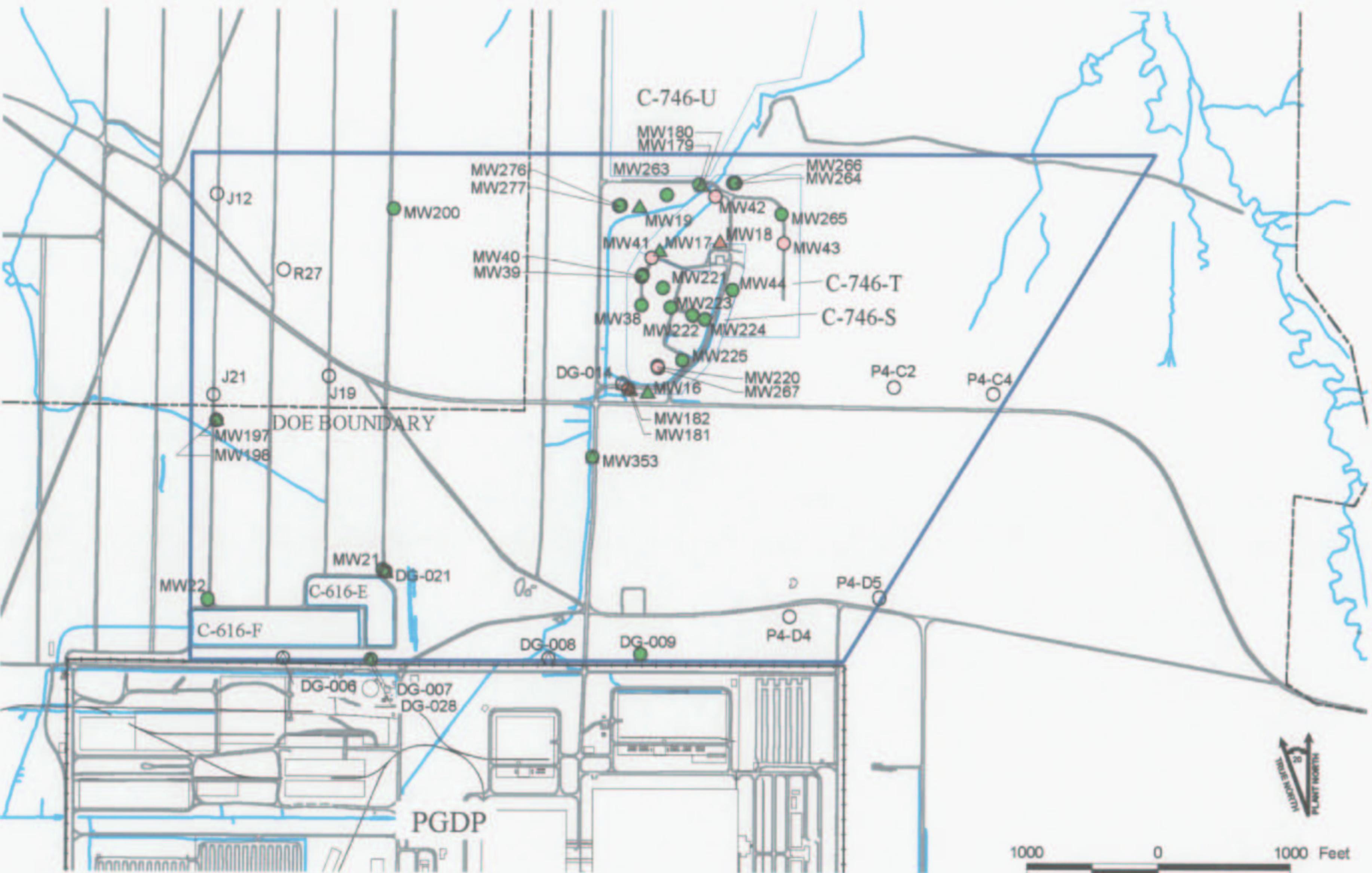
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Fig. B.11. C-746-S&T RI scoping area: beryllium in soil.

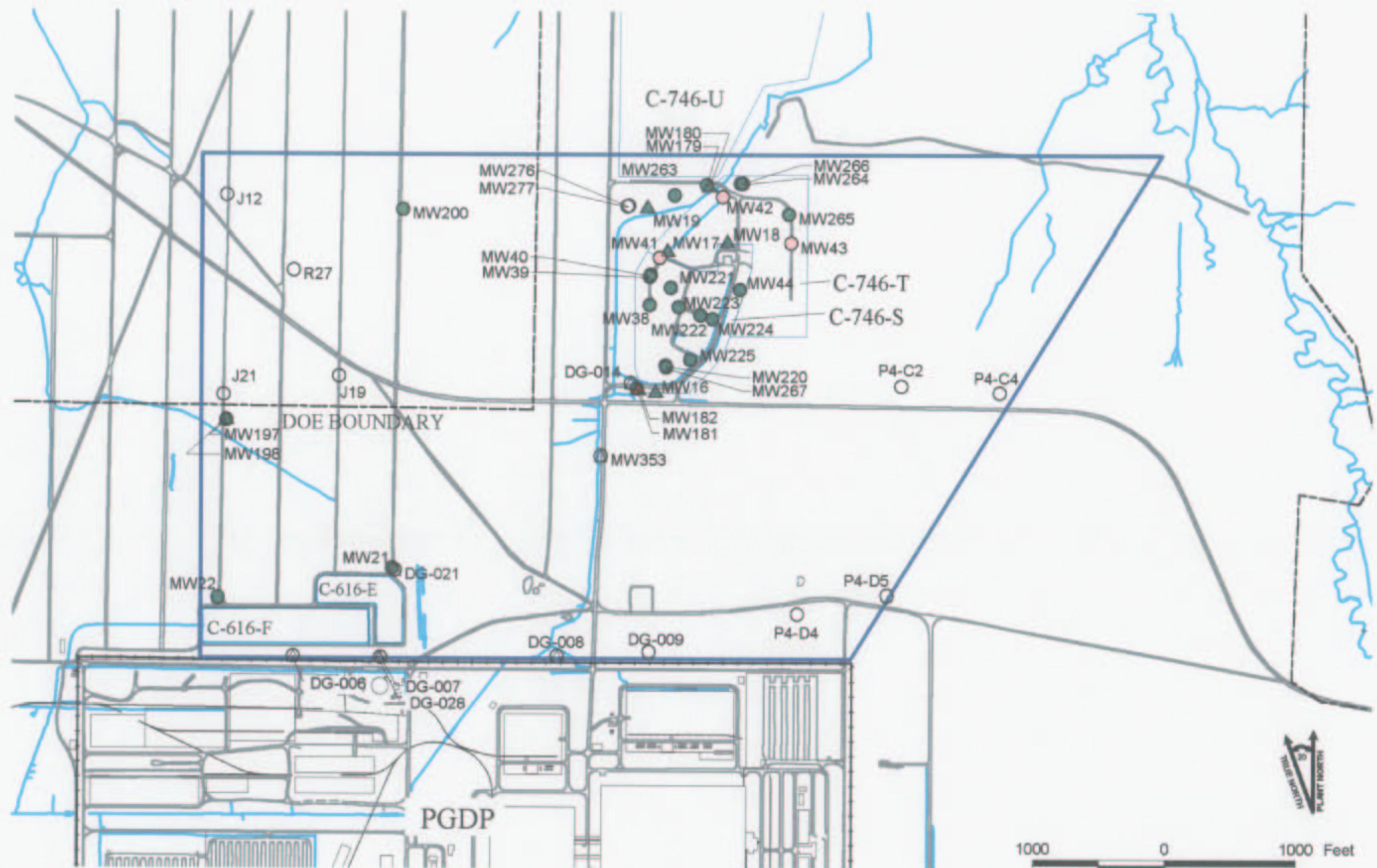


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<b>LEGEND</b> FENCE ROAD STREAM LANDFILL BOUNDARY C-746-S&T RI SCOPING AREA △ UCRS GROUNDWATER SAMPLE ○ RGA GROUNDWATER SAMPLE <p>NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.</p>	DETECTED, > MCL AT 10 % FOD DETECTED, > MCL DETECTED, < MCL NOT DETECTED	<b>U.S. DEPARTMENT OF ENERGY</b> DOE OAK RIDGE OPERATIONS PADUCAH GASEOUS DIFFUSION PLANT  <b>BECHTEL JACOBS COMPANY LLC</b> <small>Managed for the US Department of Energy under US Government Contract DE-AC-05-98OR22700</small> <small>Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio</small>
		Science Applications International Corporation <small>P.O. Box 2502 Oak Ridge, Tennessee 37831</small>

Fig. B.12. C-746-S&amp;T RI scoping area: cadmium in groundwater.



**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE  
○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED, > MCL  
> 10% FREQUENCY
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

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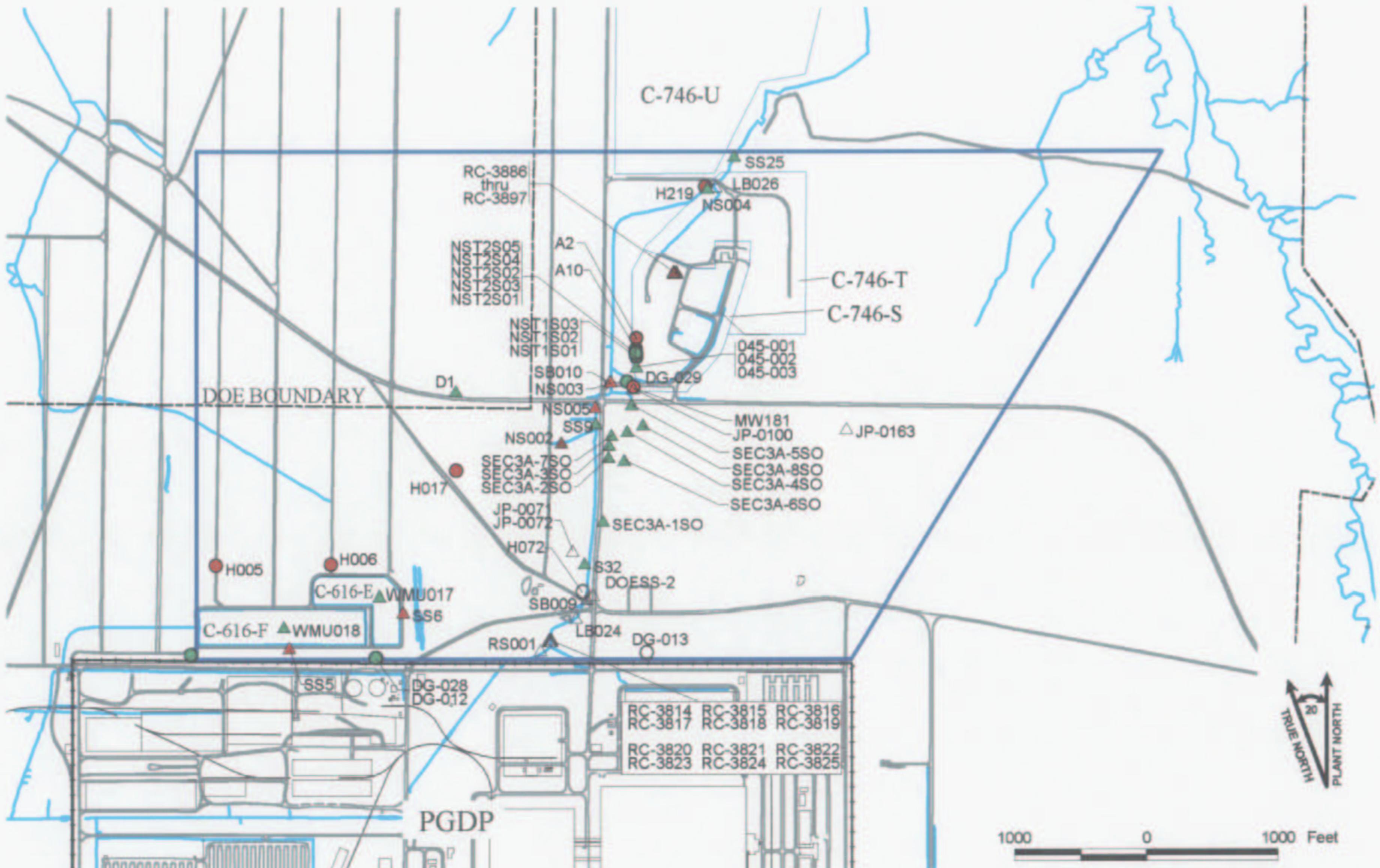
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Fig. B.13. C-746-S&T RI scoping area: dissolved cadmium in groundwater.



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LEGEND

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ SURFACE SOIL SAMPLE  
○ SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

■ > 10 x BACKGROUND  
■ > 2 x BACKGROUND  
■ > 1 x BACKGROUND  
■ DETECTED, < BACKGROUND  
■ NOT DETECTED

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

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PADUCAH GASEOUS DIFFUSION PLANT

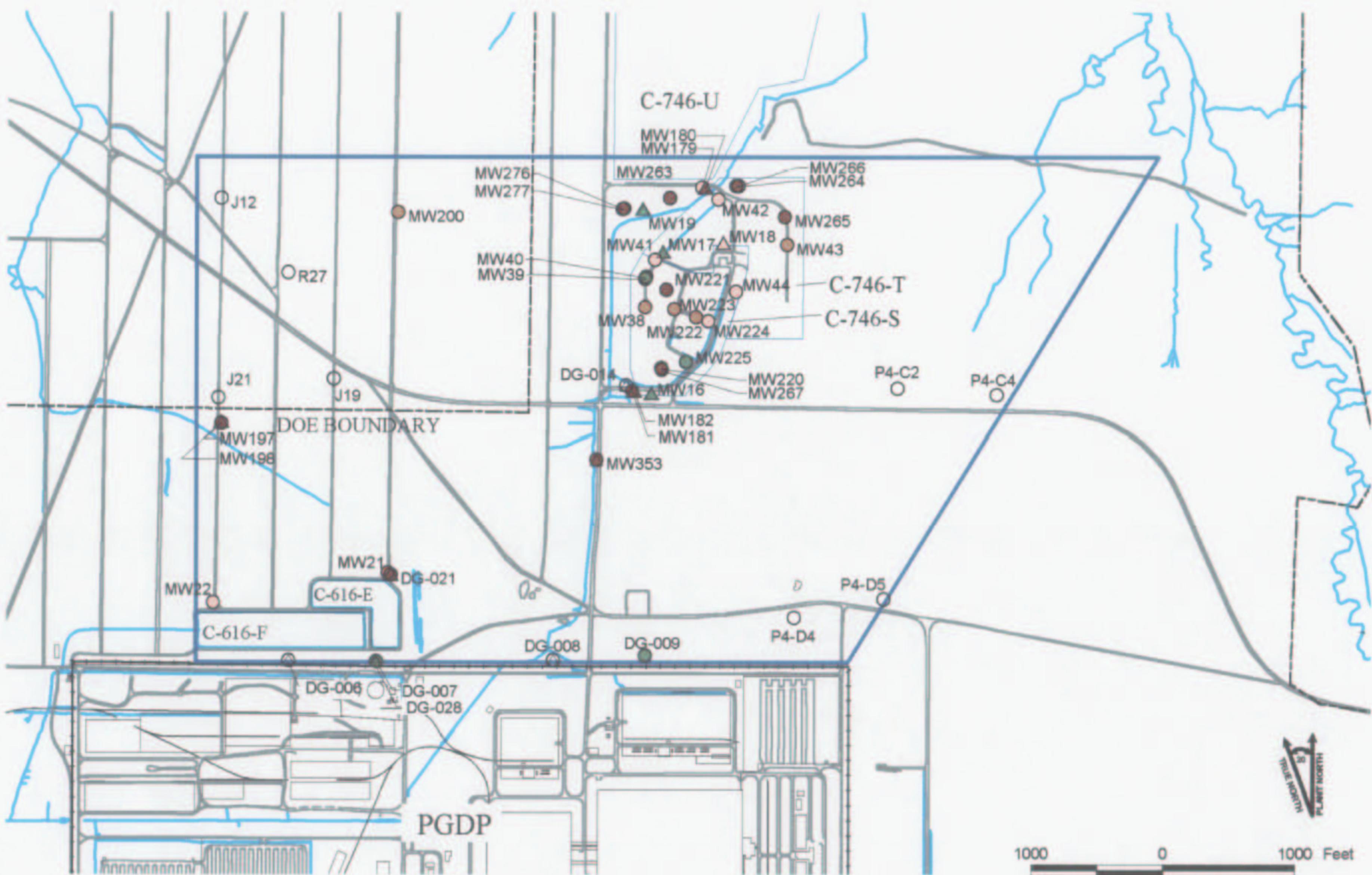
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Fig. B.14. C-746-S&T RI scoping area: cadmium in soil.



■	DETECTED, > MCL > 10% FREQUENCY
■	DETECTED, > MCL
■	DETECTED, < MCL
■	NOT DETECTED

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PADUCAH GASEOUS DIFFUSION PLANT

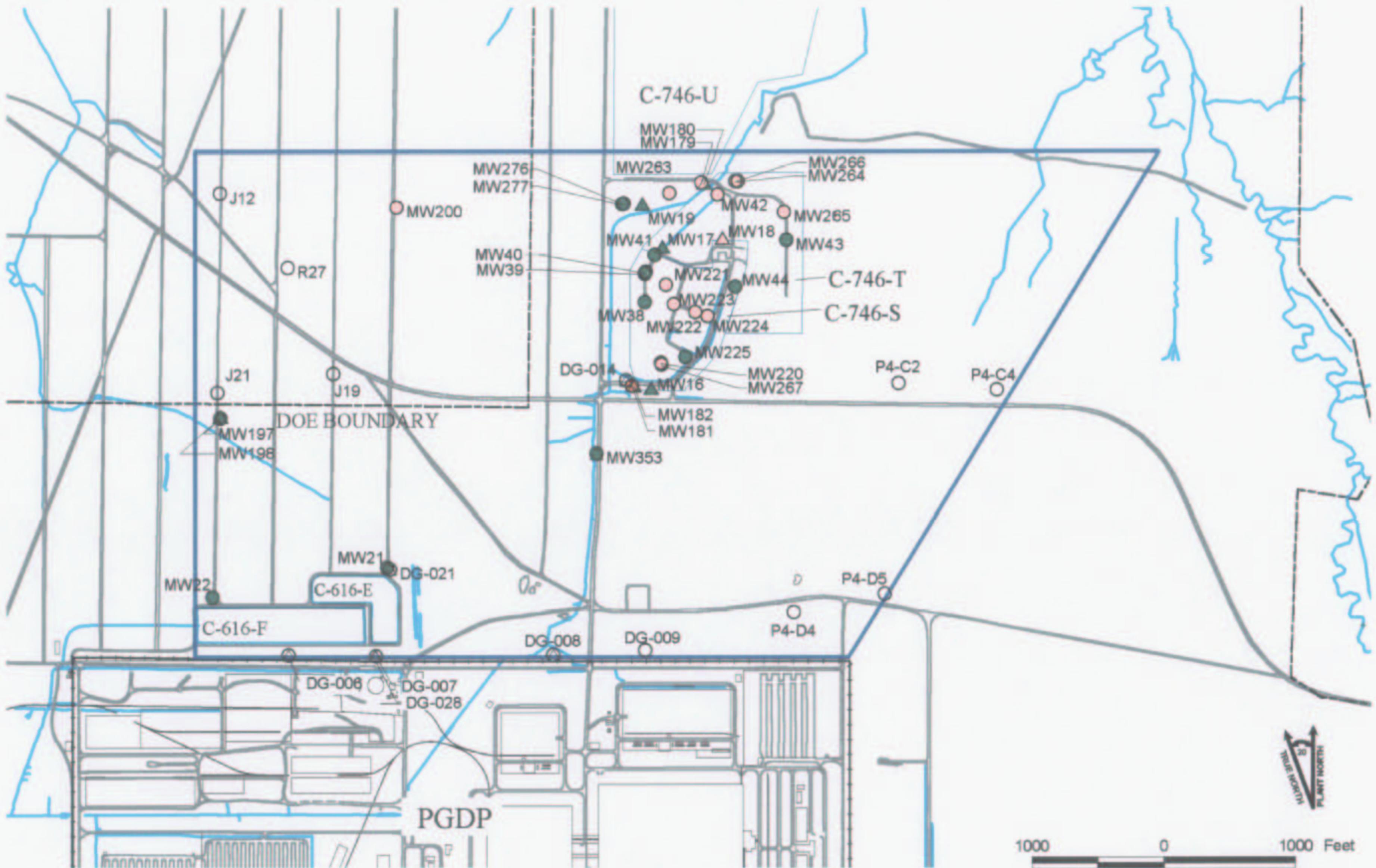
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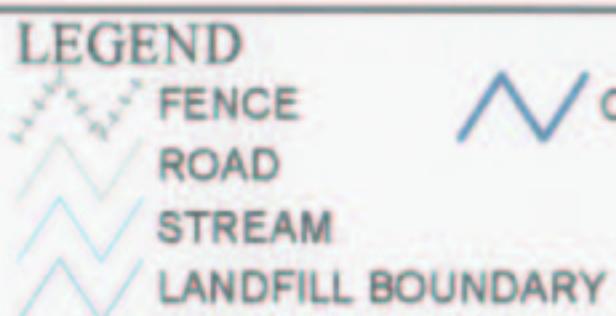
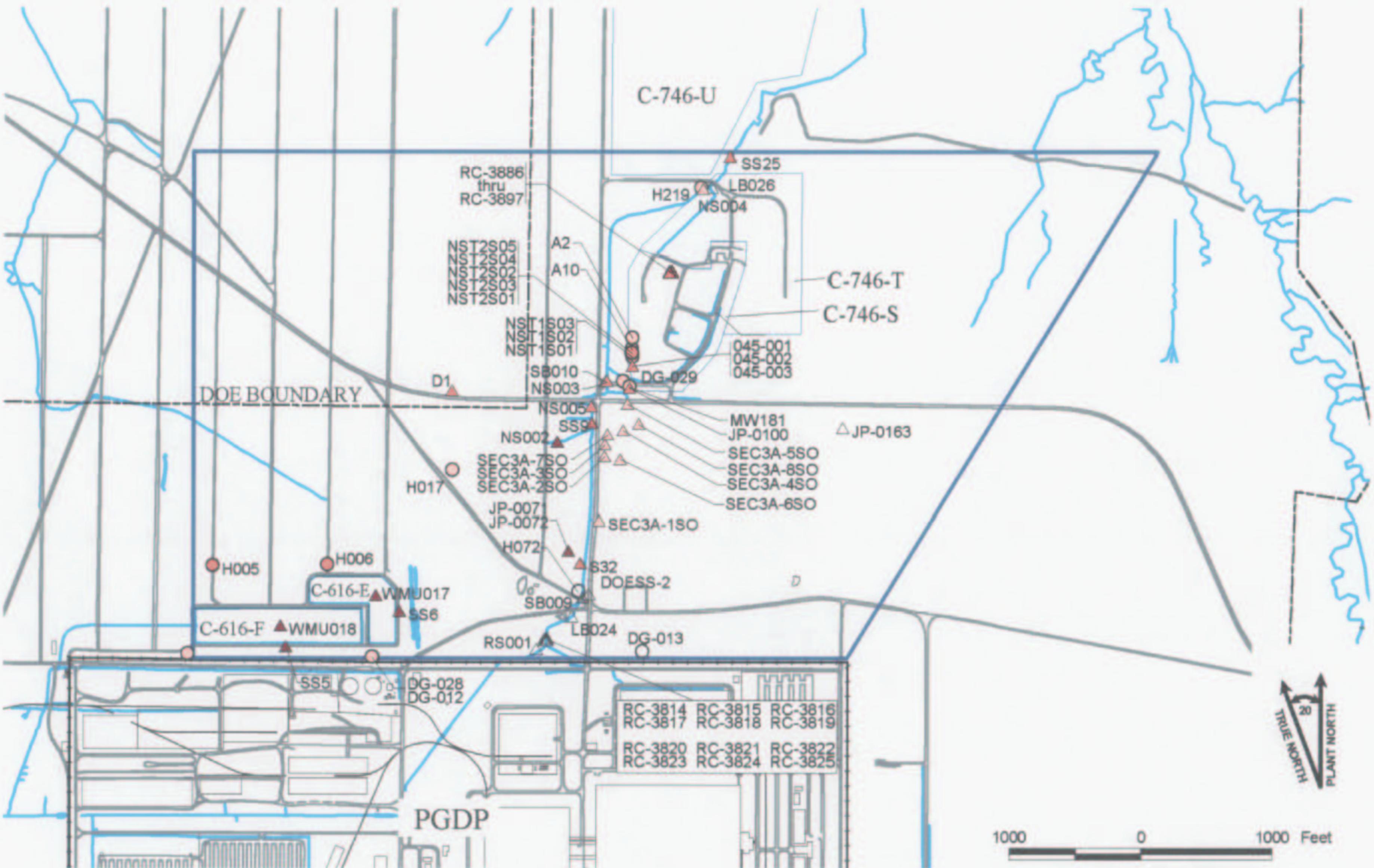
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Fig. B.15. C-746-S&T RI scoping area: chromium in groundwater.



<b>LEGEND</b> FENCE ROAD STREAM LANDFILL BOUNDARY C-746-S&T RI SCOPING AREA UCRS GROUNDWATER SAMPLE RGA GROUNDWATER SAMPLE <p>NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.</p>	DETECTED, > MCL > 10% <input type="checkbox"/> FREQUENCY DETECTED, > MCL DETECTED, < MCL NOT DETECTED	<b>U.S. DEPARTMENT OF ENERGY</b> DOE OAK RIDGE OPERATIONS PADUCAH GASEOUS DIFFUSION PLANT <hr/> <b>BECHTEL JACOBS COMPANY LLC</b> MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER US GOVERNMENT CONTRACT DE-AC-05-98OR22700 Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio
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Fig. B.16. C-746-S&amp;T RI scoping area: dissolved chromium in groundwater.



C-746-S&T RI SCOPING AREA

△ SURFACE SOIL SAMPLE

○ SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- > 10 x BACKGROUND
- > 2 x BACKGROUND
- > 1 x BACKGROUND
- DETECTED, < BACKGROUND
- NOT DETECTED

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PADUCAH GASEOUS DIFFUSION PLANT

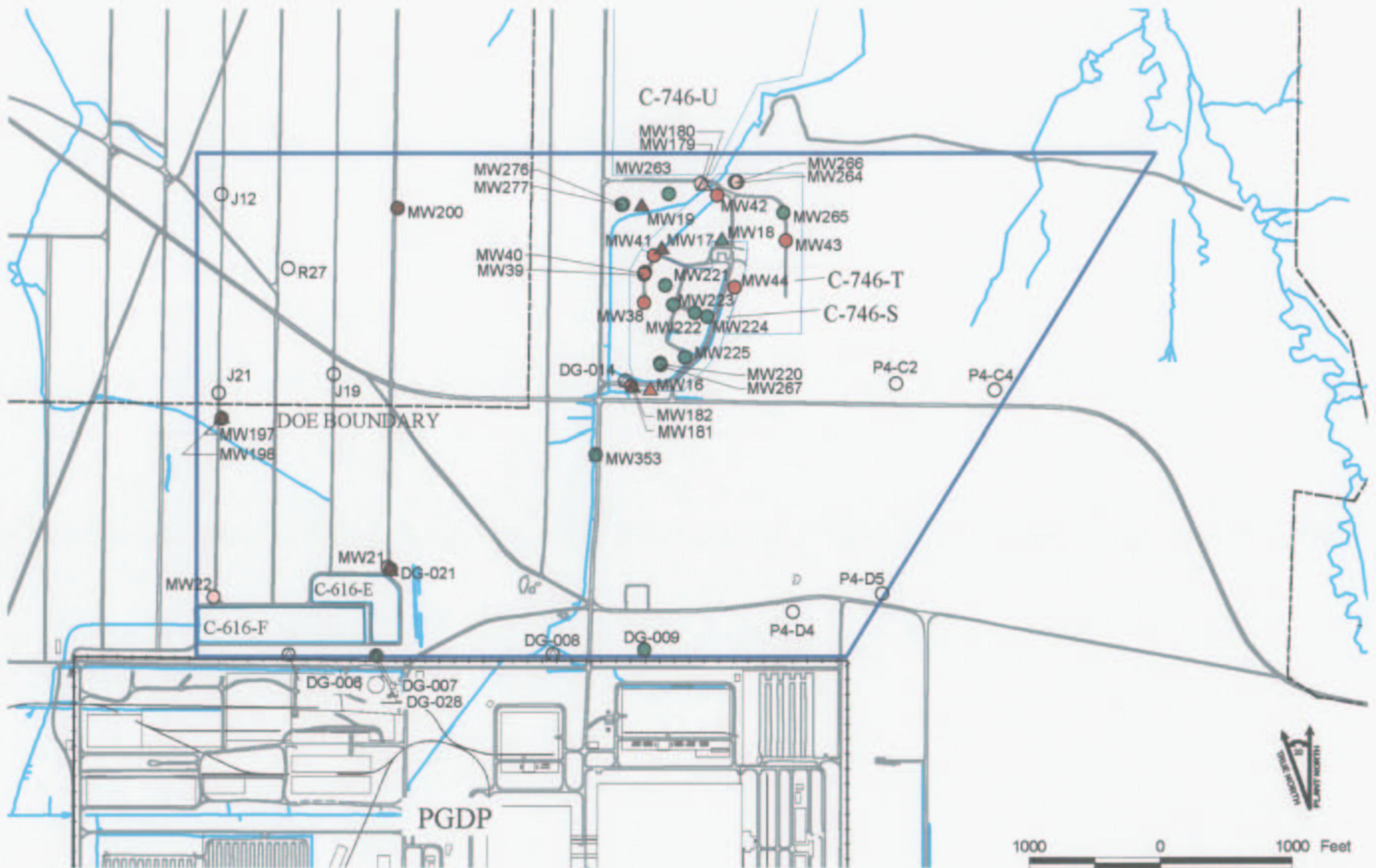
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Fig. B.17. C-746-S&T RI scoping area: chromium in soil.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE

○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED, > MCL  
> 10 % FREQUENCY
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

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PADUCAH GASEOUS DIFFUSION PLANT

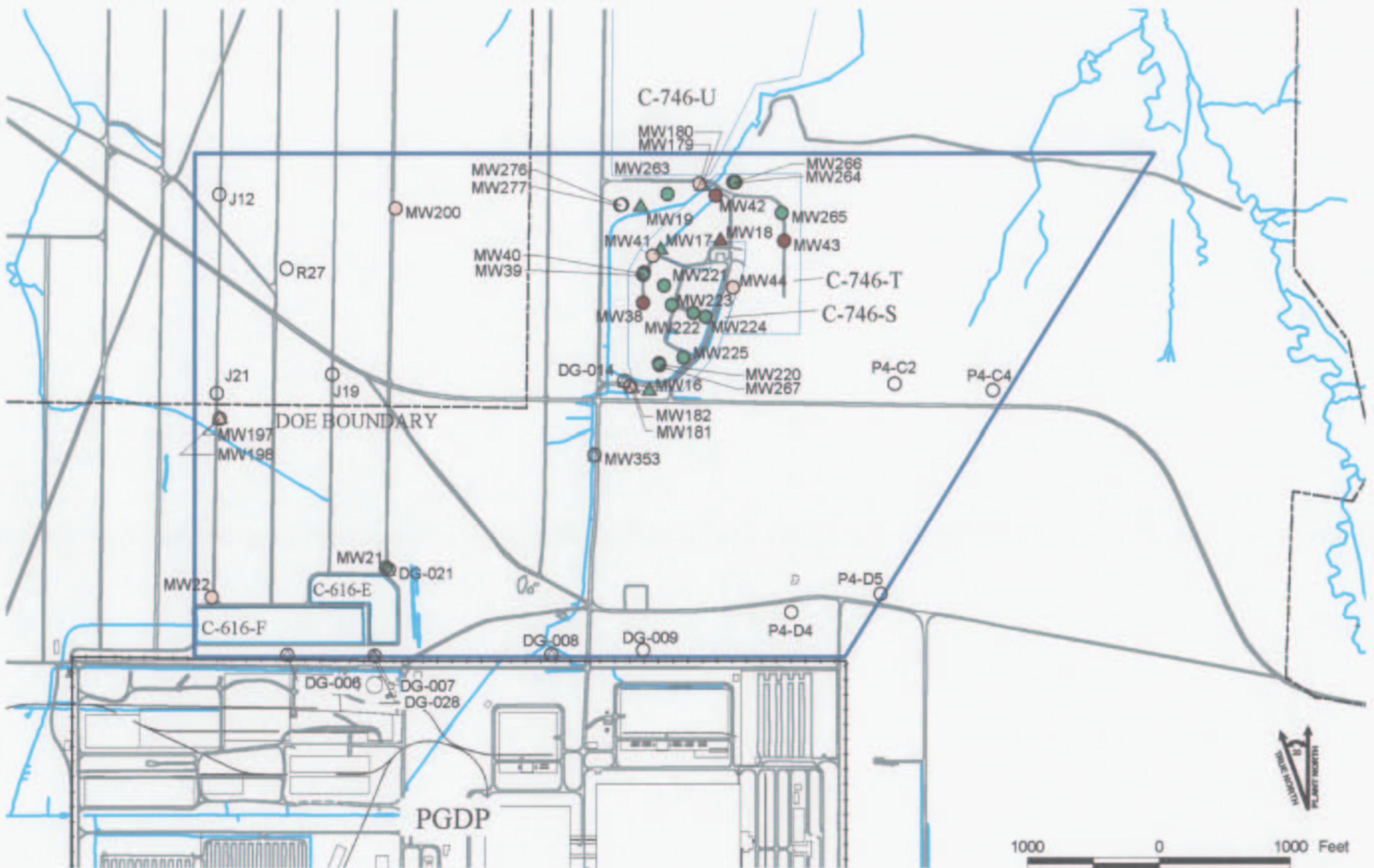
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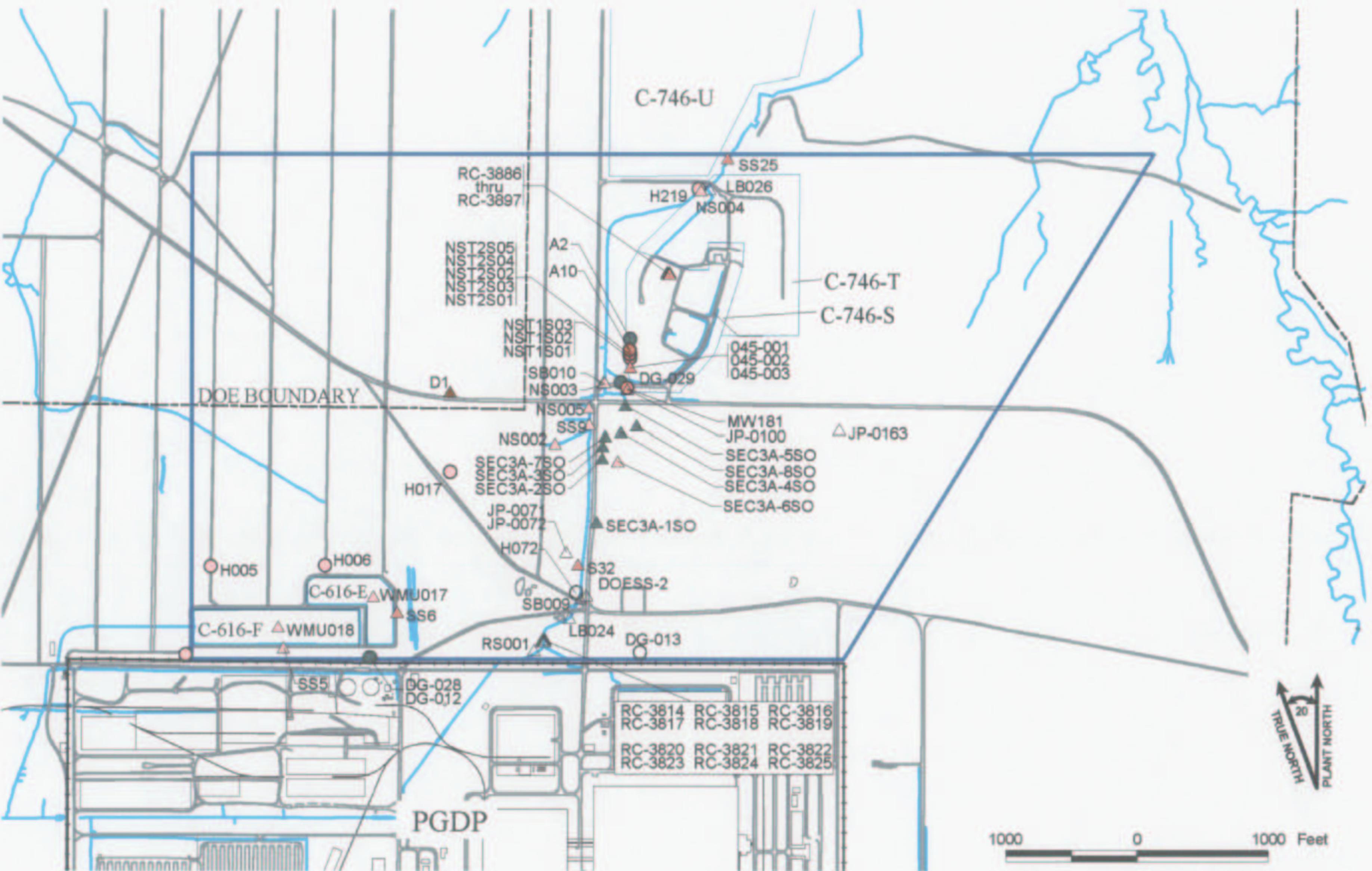
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Fig. B.18. C-746-S&T RI scoping area: lead in groundwater.



**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

SURFACE SOIL SAMPLE

SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

> 10 x BACKGROUND

> 2 x BACKGROUND

> 1 x BACKGROUND

DETECTED, < BACKGROUND

NOT DETECTED

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

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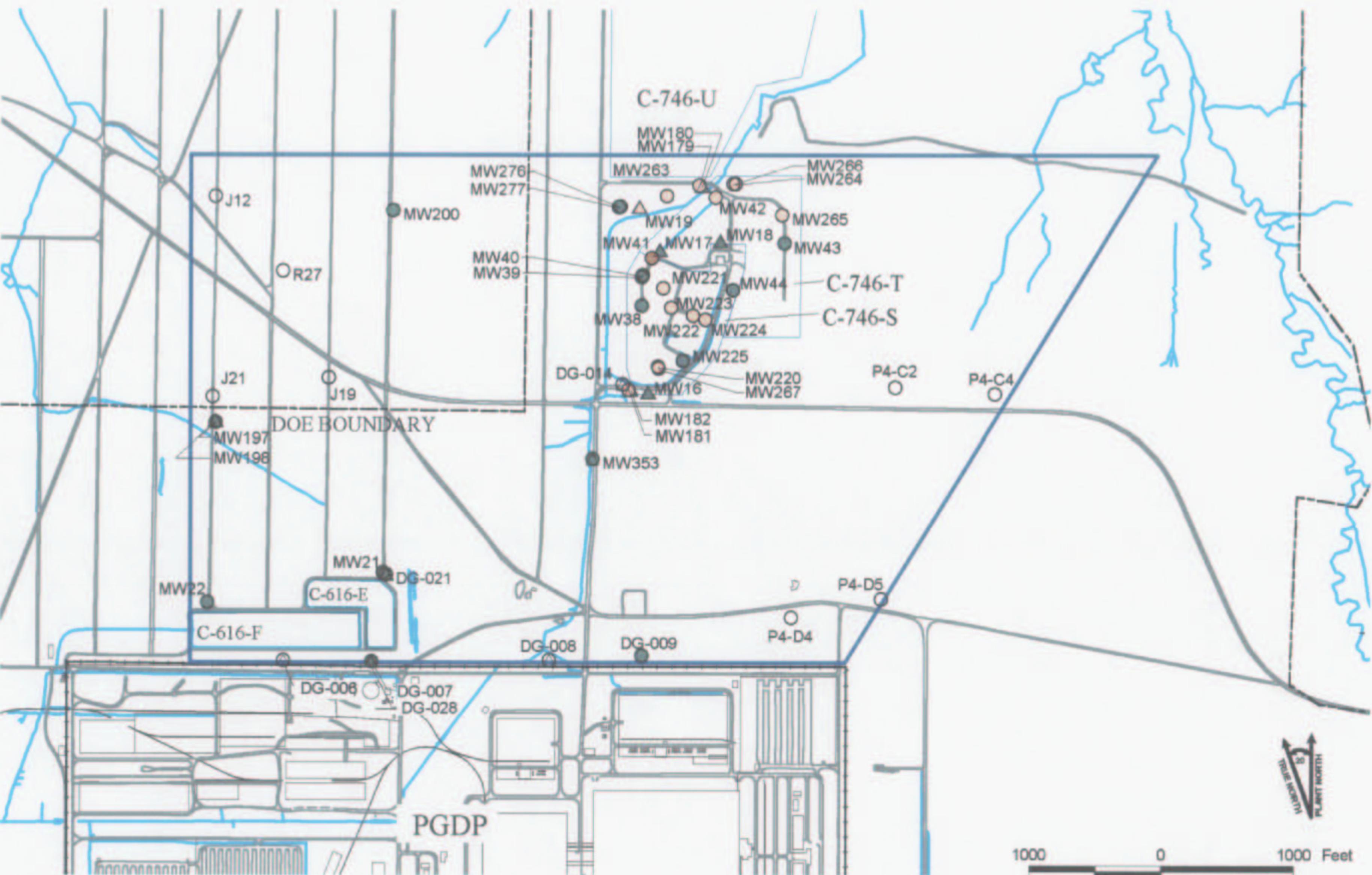
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Fig. B.20. C-746-S&T RI scoping area: lead in soil.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE  
○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED, > MCL  
> 10% FREQUENCY
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

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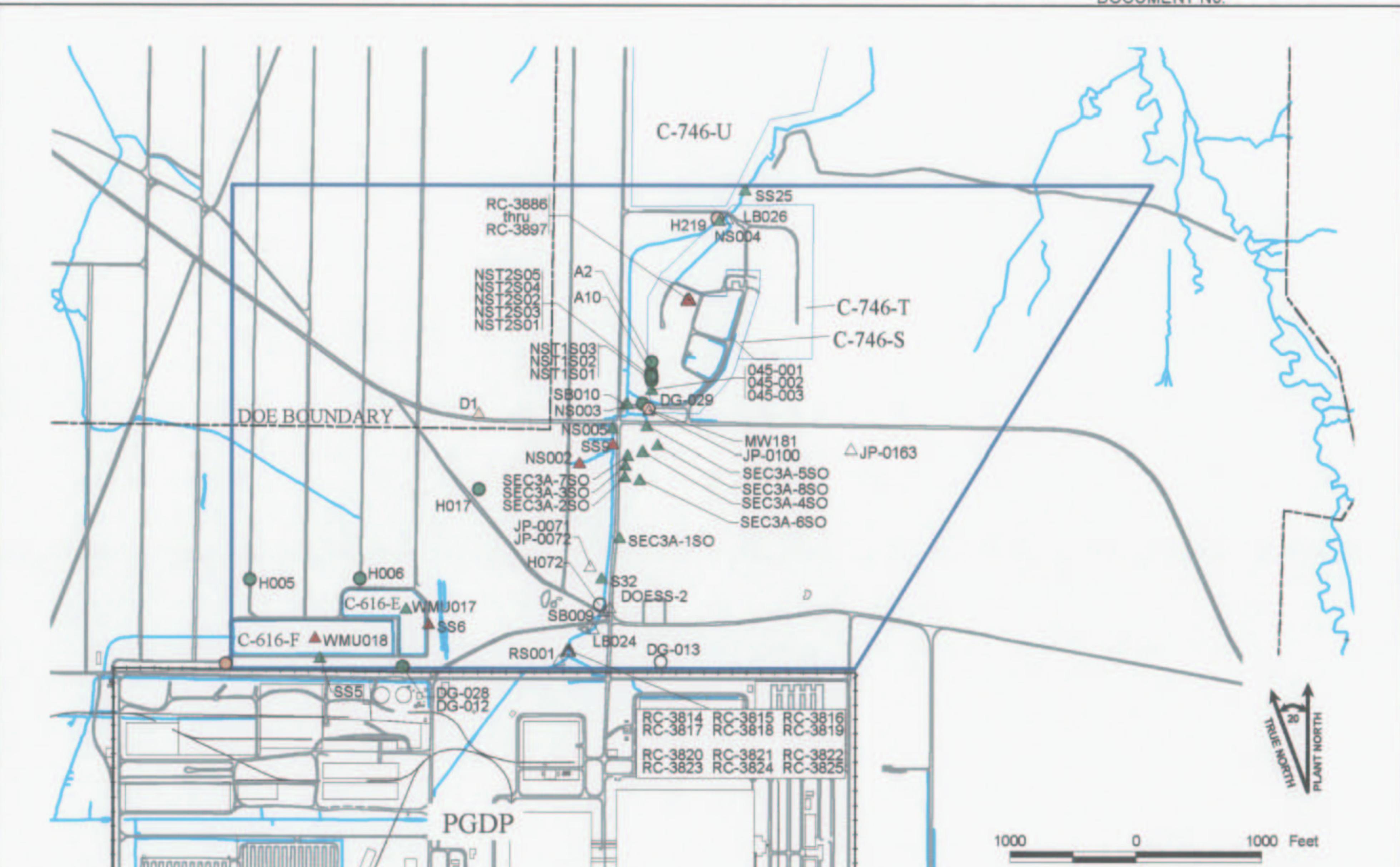
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Fig. B.21. C-746-S&T RI scoping area: silver in groundwater.



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## LEGEND

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

SURFACE SOIL SAMPLE

SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

> 10 x BACKGROUND

> 2 x BACKGROUND

> 1 x BACKGROUND

DETECTED, < BACKGROUND

NOT DETECTED

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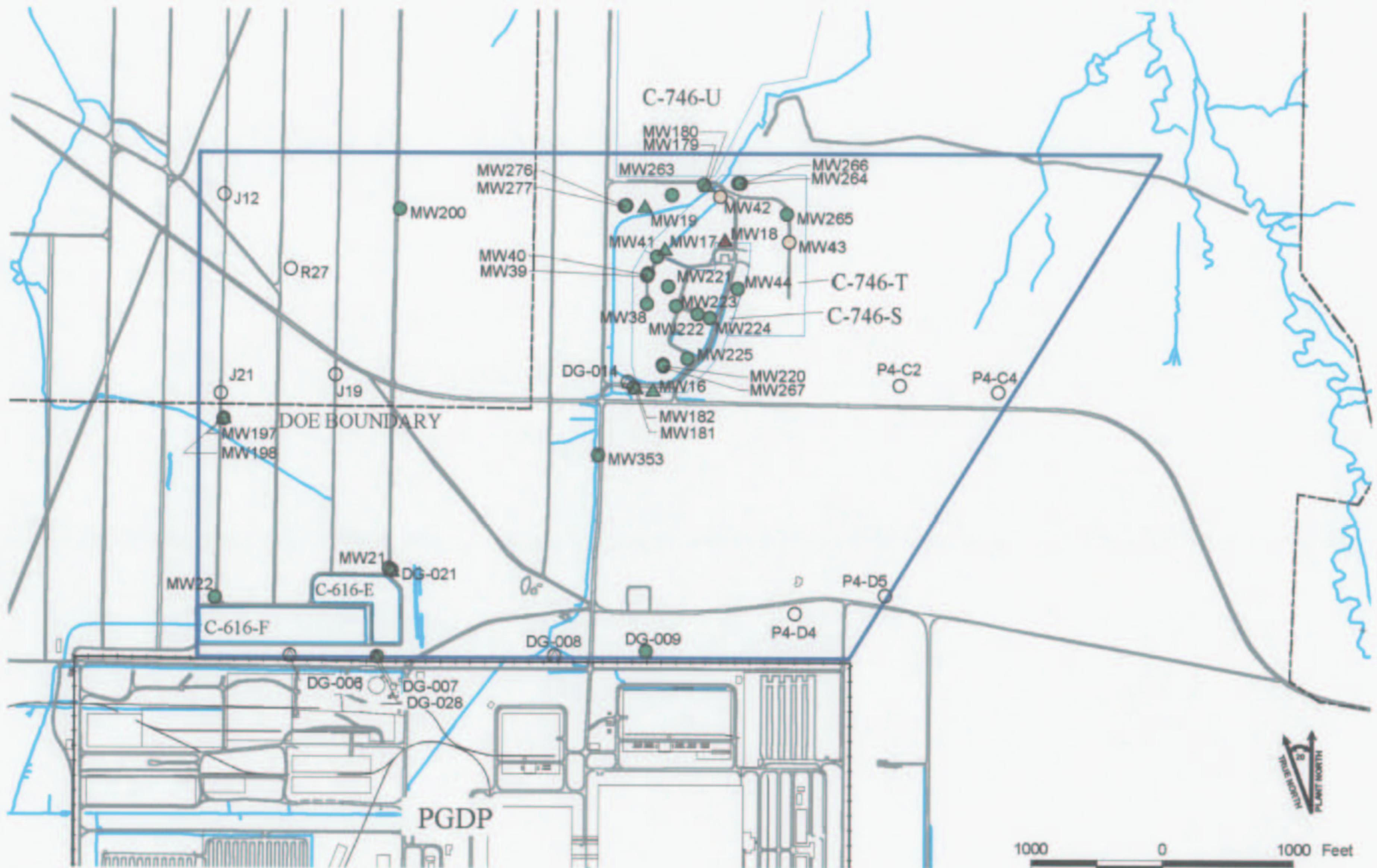
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Fig. B.22. C-746-S&T RI scoping area: silver in soil.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&amp;T RI SCOPING AREA

 UCRS GROUNDWATER SAMPLE  
 RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED, > MCL  
> 10% FREQUENCY
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

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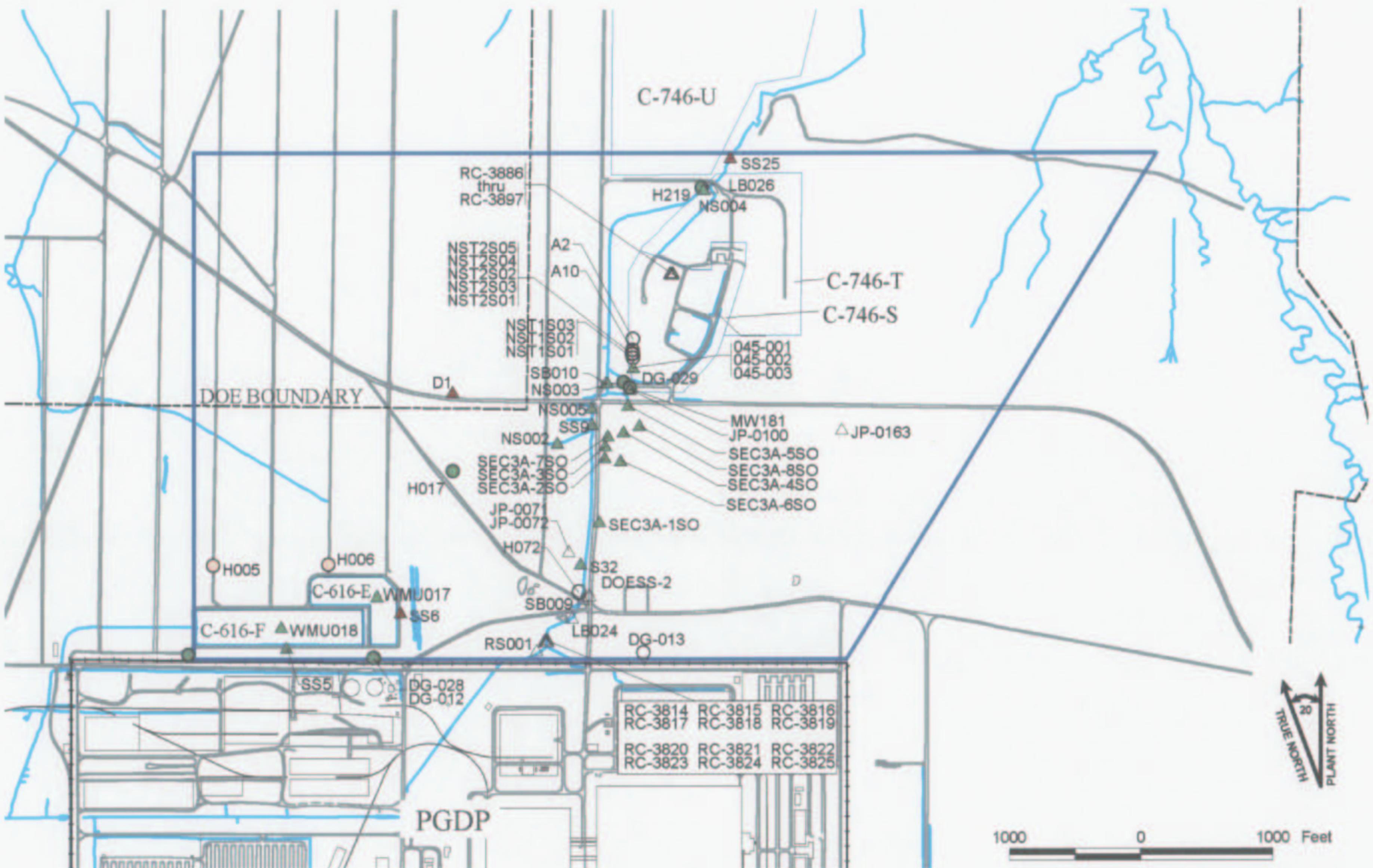
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Fig. B.23. C-746-S&T RI scoping area: thallium in groundwater.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ SURFACE SOIL SAMPLE

○ SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

■ > 10 x BACKGROUND

■ > 2 x BACKGROUND

■ > 1 x BACKGROUND

■ DETECTED, < BACKGROUND

■ NOT DETECTED

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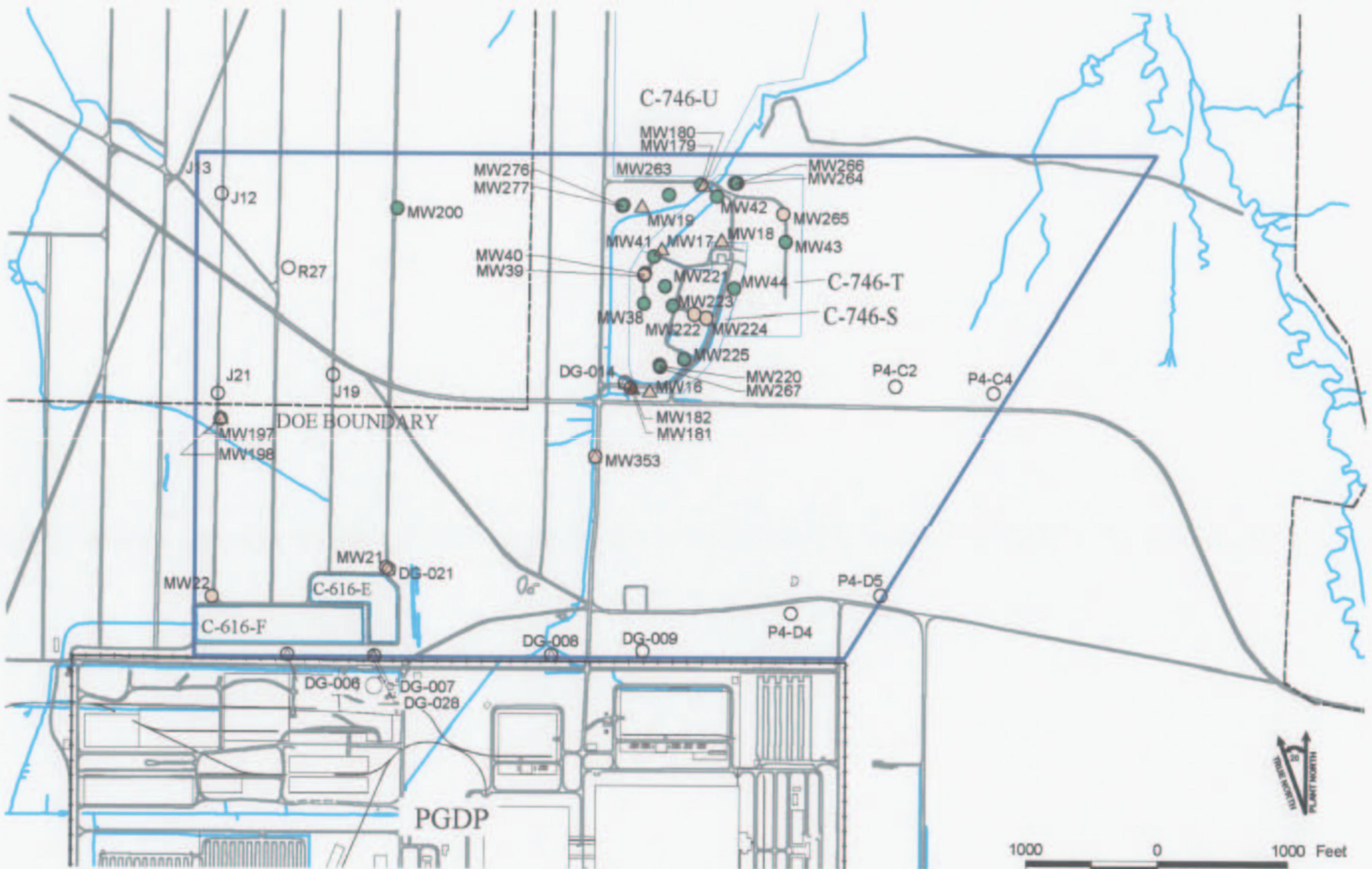
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Fig. B.24. C-746-S&T RI scoping area: thallium in soil.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY
- C-746-S&T RI SCOPING AREA
- UCRS GROUNDWATER SAMPLE
- RGA GROUNDWATER SAMPLE
- NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED, > MCL  
> 10% FREQUENCY
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

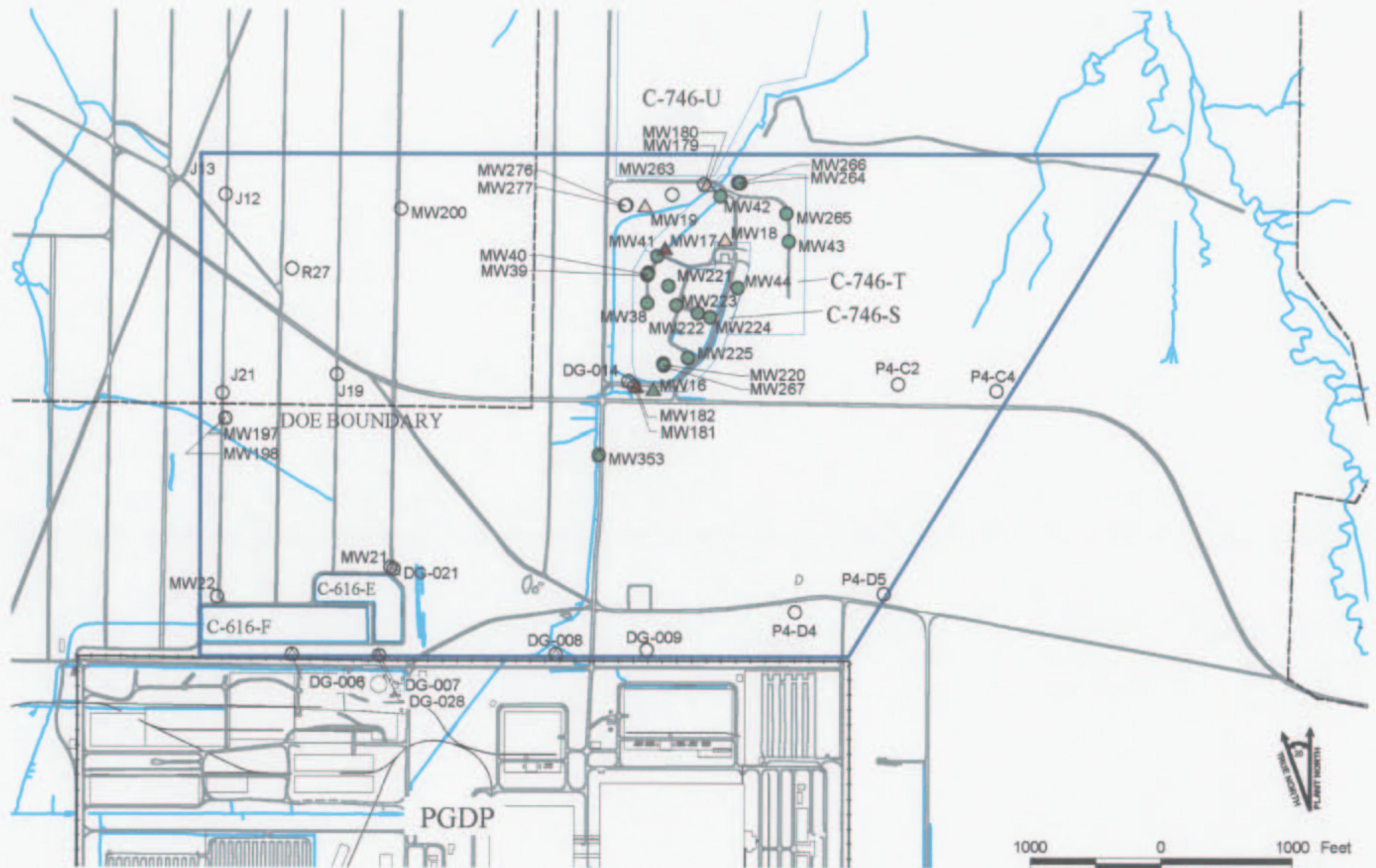
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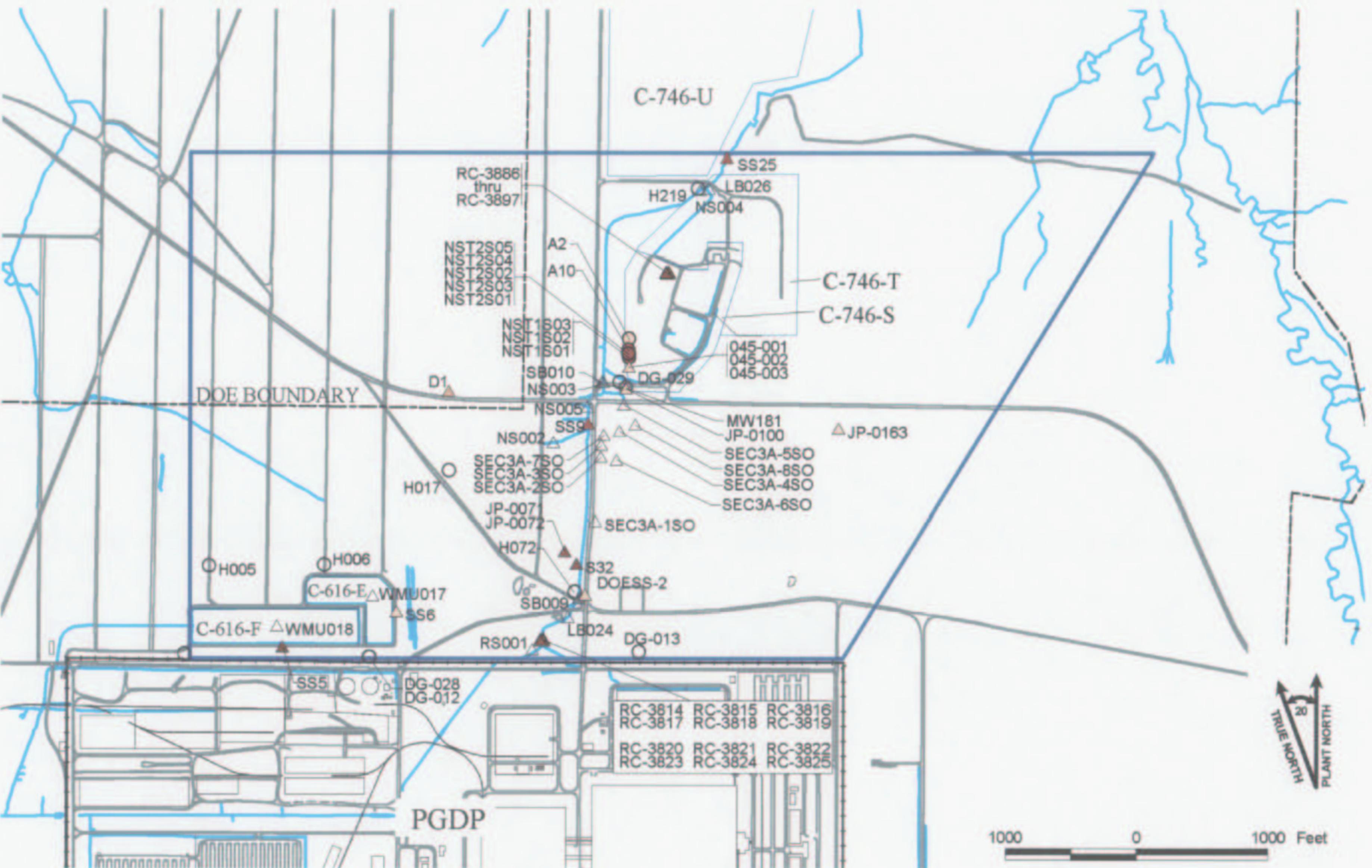
Fig. B.25. C-746-S&T RI scoping area: dissolved uranium in groundwater.



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<b>LEGEND</b> FENCE ROAD STREAM LANDFILL BOUNDARY C-746-S&T RI SCOPING AREA UCRS GROUNDWATER SAMPLE RGA GROUNDWATER SAMPLE <p>NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.</p>	DETECTED, > MCL > 10% FREQUENCY DETECTED, > MCL DETECTED, < MCL NOT DETECTED	<b>U.S. DEPARTMENT OF ENERGY</b> DOE OAK RIDGE OPERATIONS PADUCAH GASEOUS DIFFUSION PLANT
		<b>BECHTEL JACOBS COMPANY LLC</b> <small>MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER US GOVERNMENT CONTRACT DE-AC-96OR22700</small> Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio
Fig. B.26. C-746-S&T RI scoping area: dissolved uranium in groundwater.	Science Applications International Corporation <small>P.O. Box 2502 Oak Ridge, Tennessee 37831</small>	FIGURE No. c5ac90001sk077.apr DATE 08-12-01

**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

SURFACE SOIL SAMPLE

SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

> 10 x BACKGROUND

> 2 x BACKGROUND

> 1 x BACKGROUND

DETECTED, < BACKGROUND

NOT DETECTED

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

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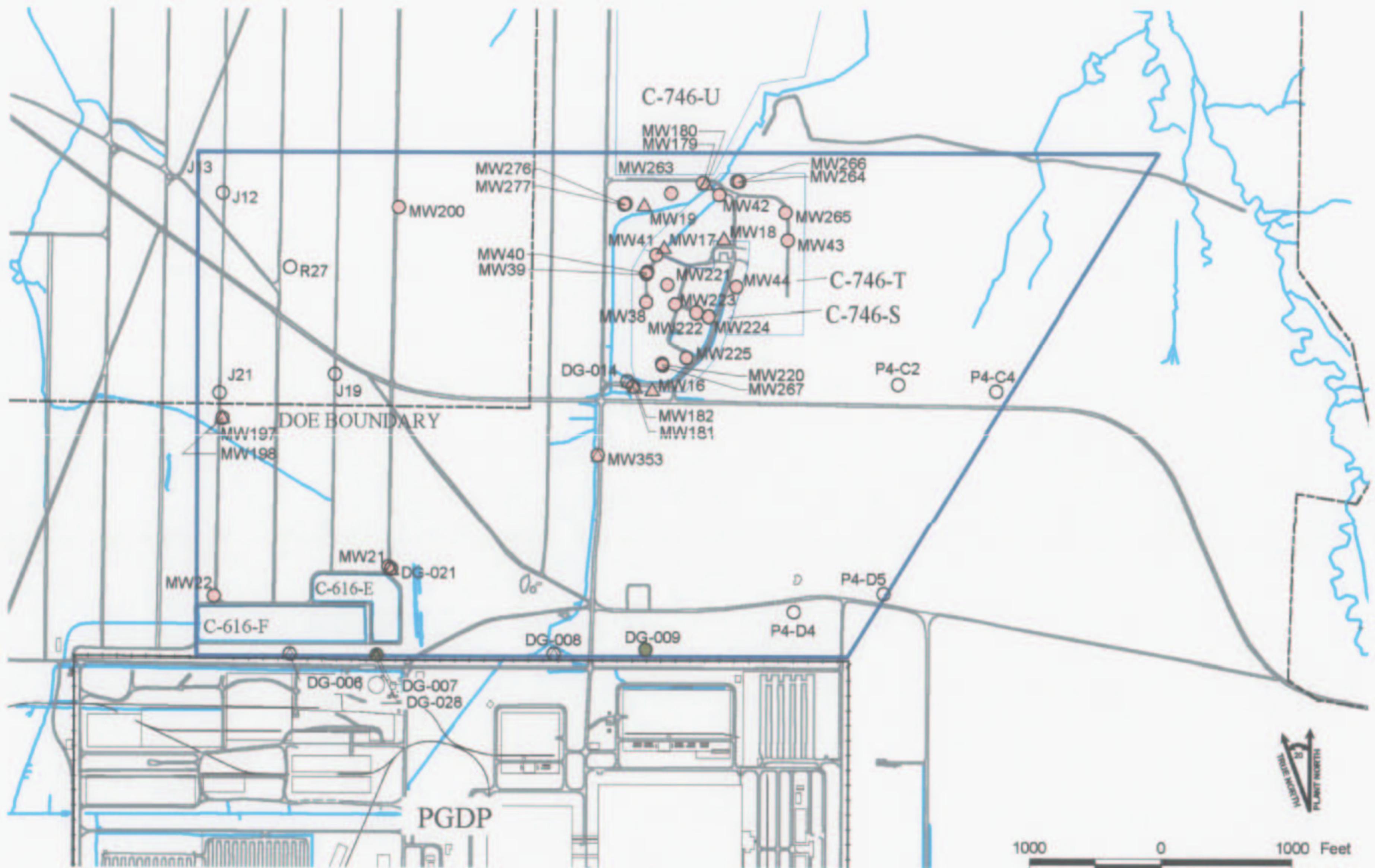
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Fig. B.27. C-746-S&T RI scoping area: uranium in soil.



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FIGURE No. c5ac90001sk078.apr  
DATE 08-12-01



**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE

○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED, > MCL > 10% FREQUENCY
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

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PADUCAH GASEOUS DIFFUSION PLANT

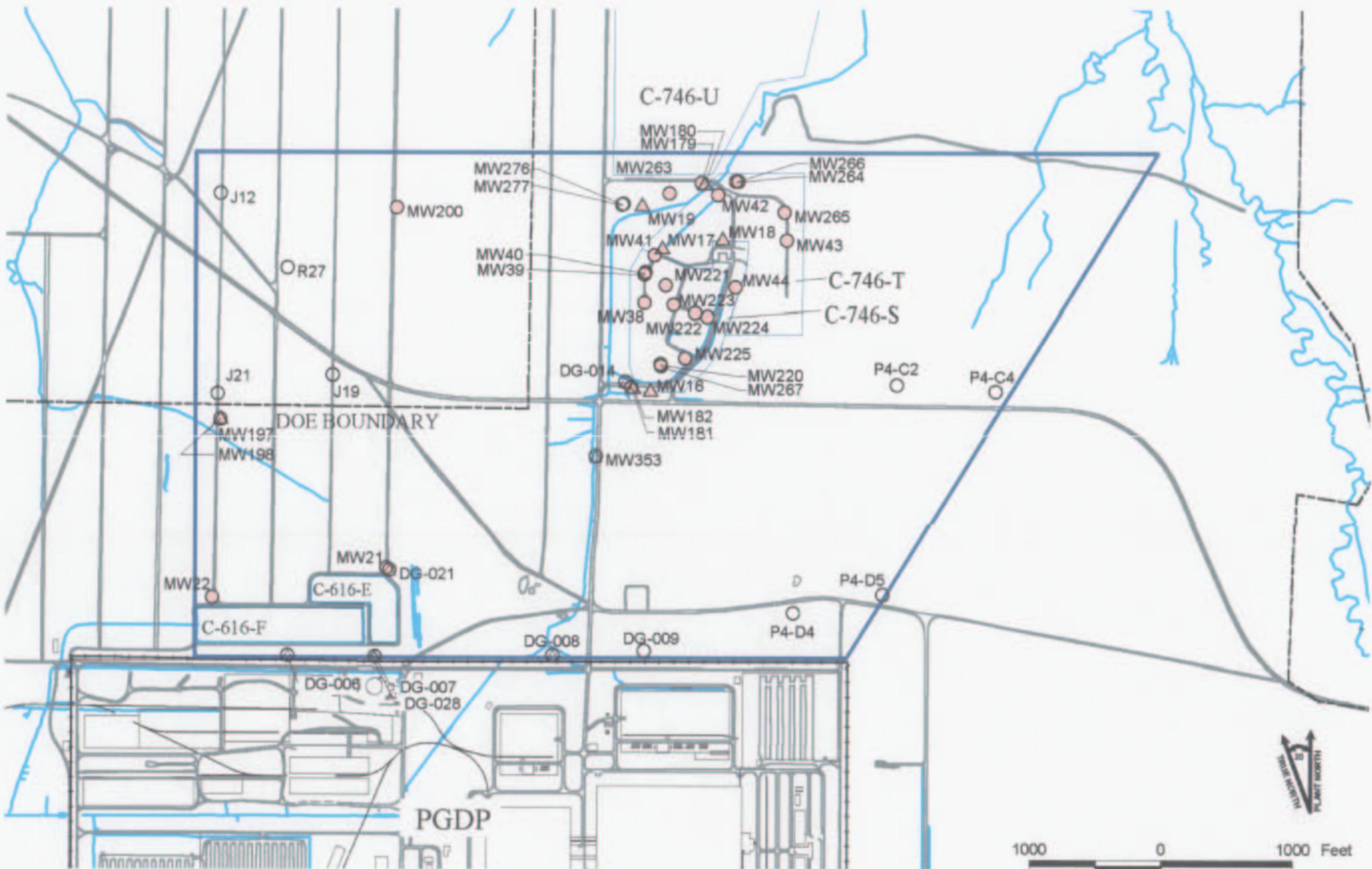
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Fig. B.28. C-746-S&T RI scoping area: zinc in groundwater.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE

○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

■ DETECTED, > MCL > 10% FREQUENCY
■ DETECTED, > MCL
■ DETECTED, < MCL
■ NOT DETECTED

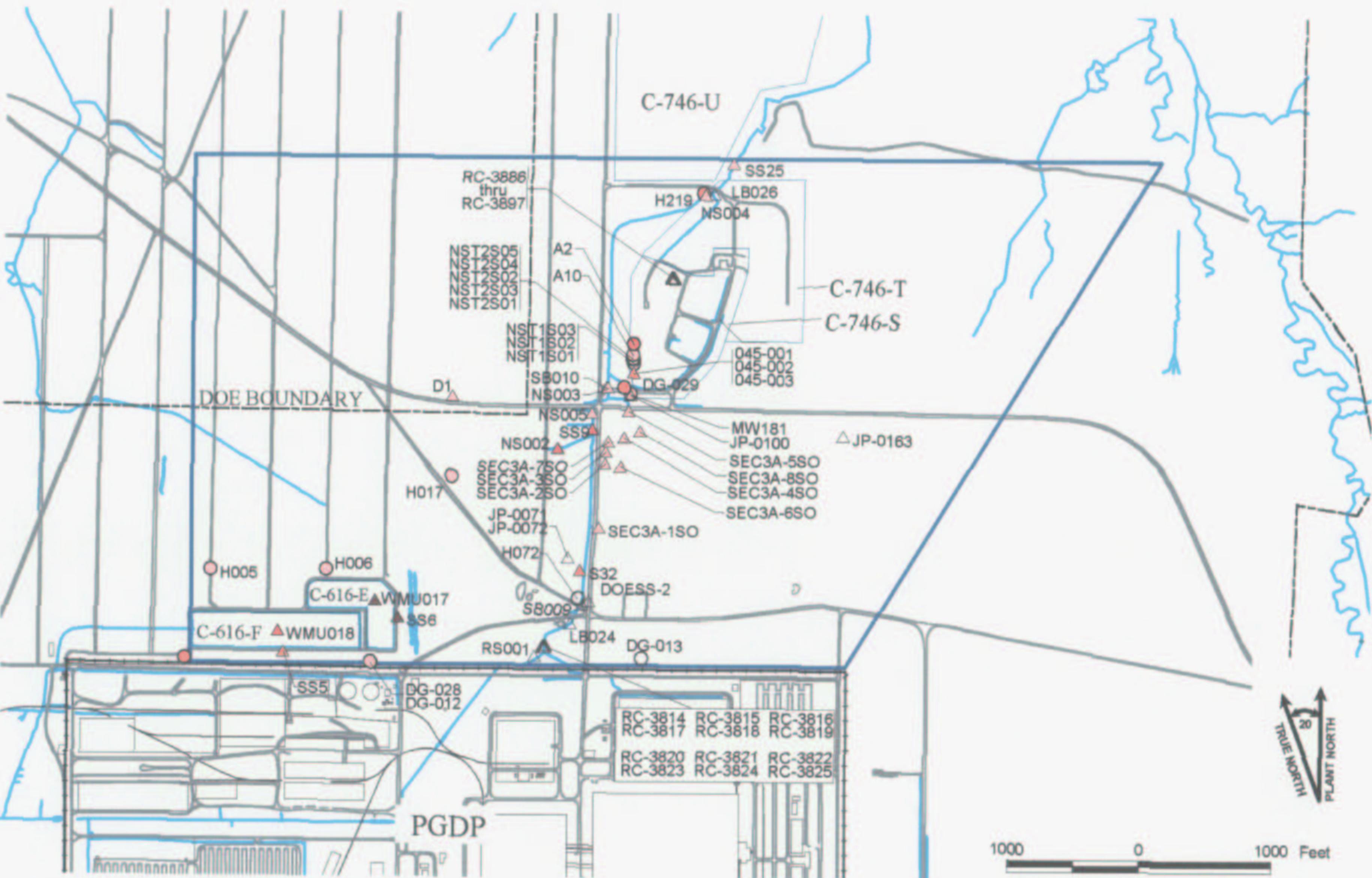
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Fig. B.29. C-746-S&T RI scoping area: dissolved zinc in groundwater.



## LEGEND

FENCE  
ROAD  
STREAM  
LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ SURFACE SOIL SAMPLE

○ SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

> 10 x BACKGROUND

> 2 x BACKGROUND

> 1 x BACKGROUND

DETECTED, < BACKGROUND

NOT DETECTED

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PADUCAH GASEOUS DIFFUSION PLANT

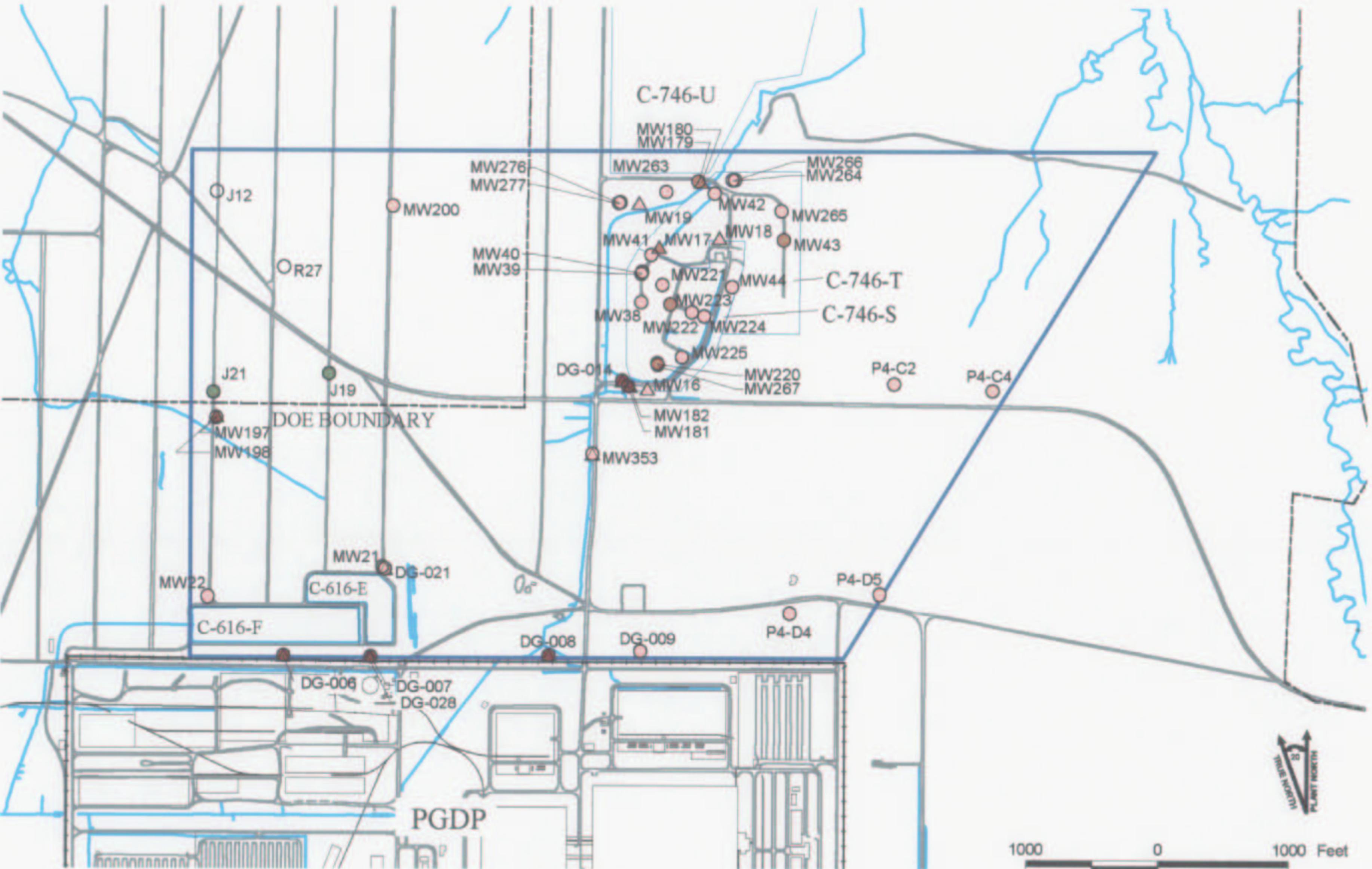
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Fig. B.30. C-746-S&T RI scoping area: zinc in soil.



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■ DETECTED, > MCL  
> 10% FREQUENCY  
■ DETECTED, > MCL  
■ DETECTED, < MCL  
■ NOT DETECTED

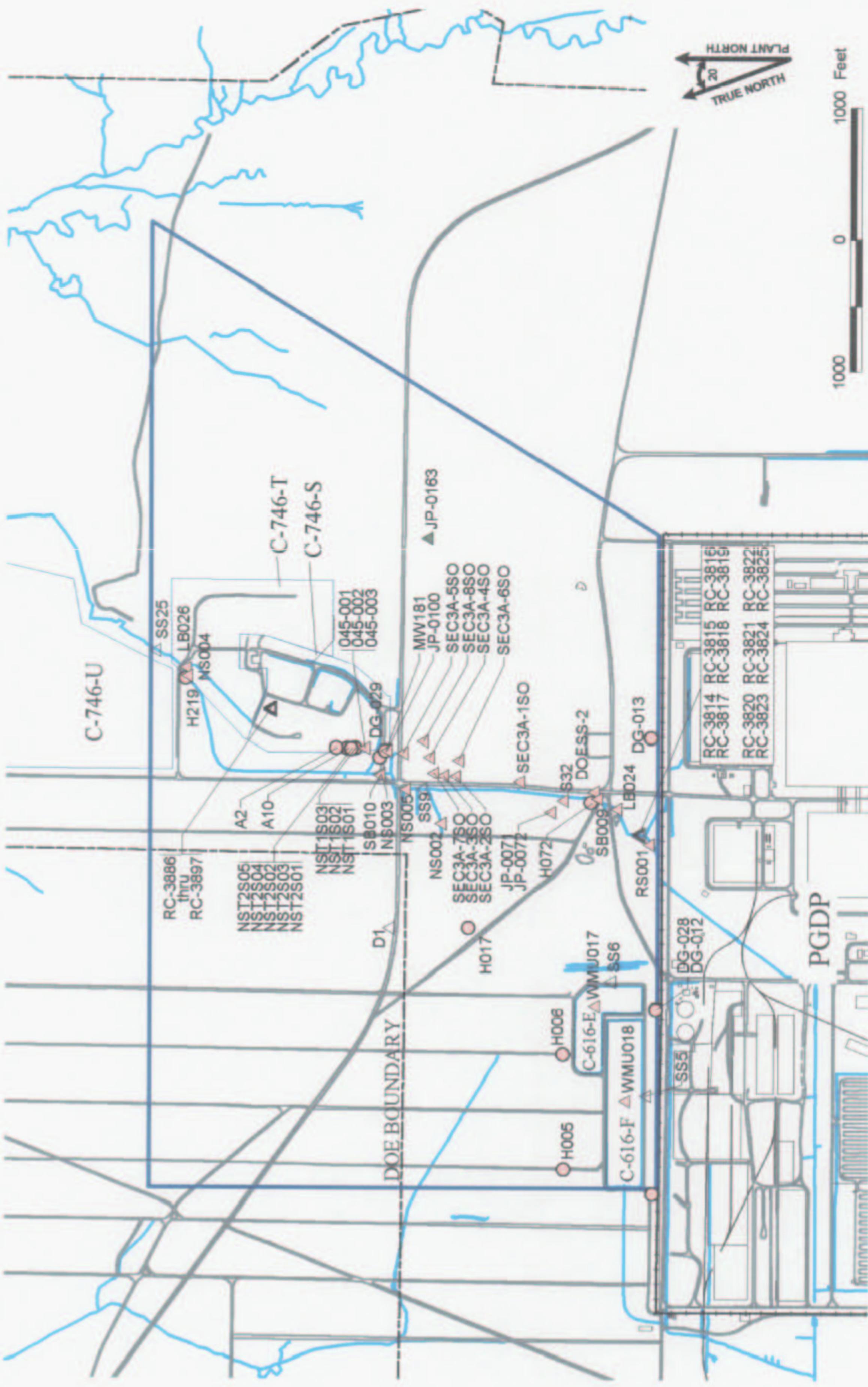
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DOE OAK RIDGE OPERATIONS  
PADUCAH GASEOUS DIFFUSION PLANT

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Fig. B.31. C-746-S&T RI scoping area: alpha activity in groundwater.

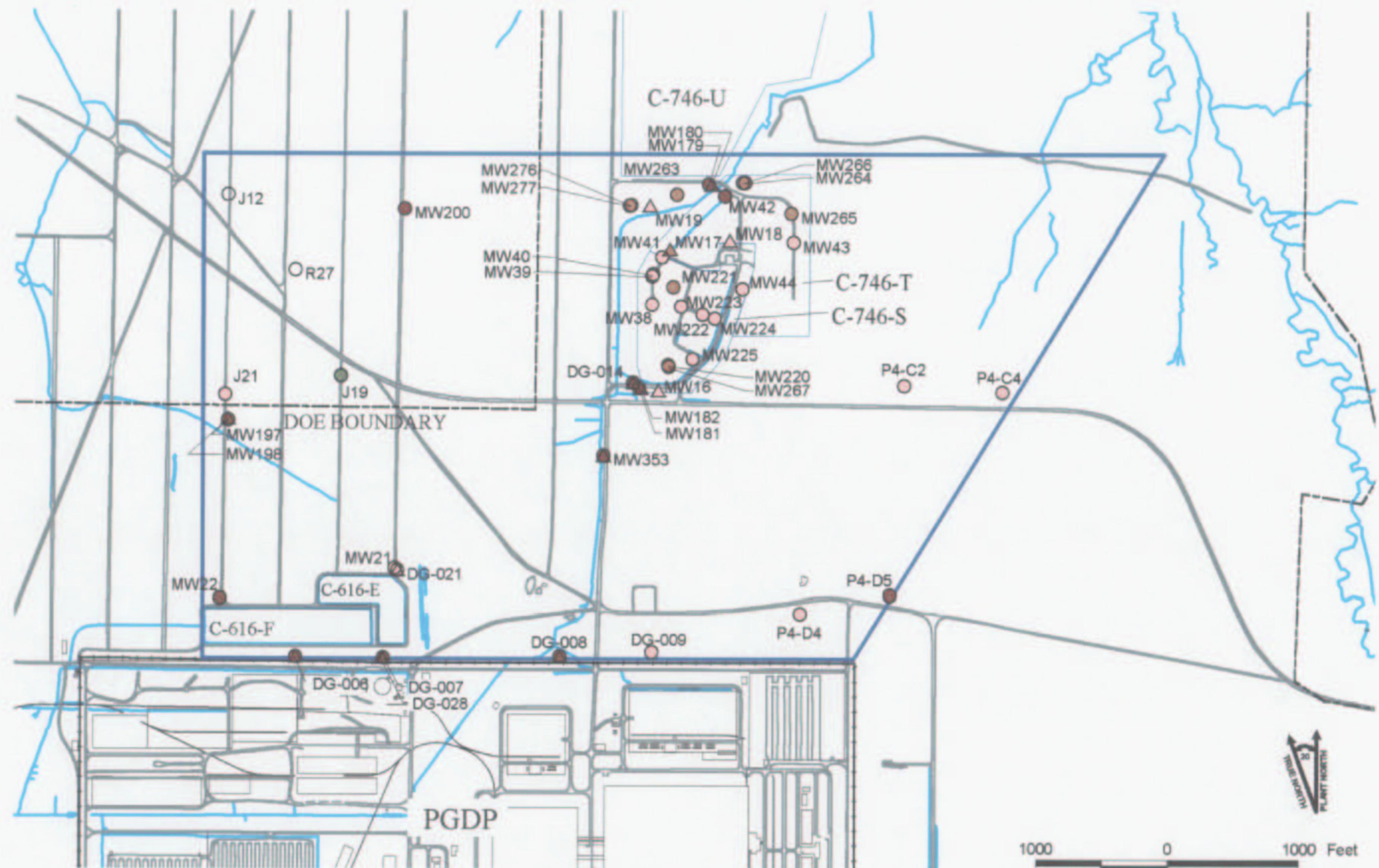


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<b>LEGEND</b> <ul style="list-style-type: none"> <li>C-746-S&amp;T RI SCOPING AREA</li> <li>FENCE</li> <li>ROAD</li> <li>STREAM</li> <li>LANDFILL BOUNDARY</li> </ul>		<b>U.S. DEPARTMENT OF ENERGY</b> DOE OAK RIDGE OPERATIONS PADUCAH GASEOUS DIFFUSION PLANT
<b>NOTE:</b> Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.		<b>BECHTEL JACOBS COMPANY LLC</b> MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER US GOVERNMENT CONTRACT DE-AC05-80OR22700 Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio
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Fig. B.32. C-746-S&T RI scoping area: alpha activity in soil.



**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE

○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED, > MCL  
> 10% FREQUENCY
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

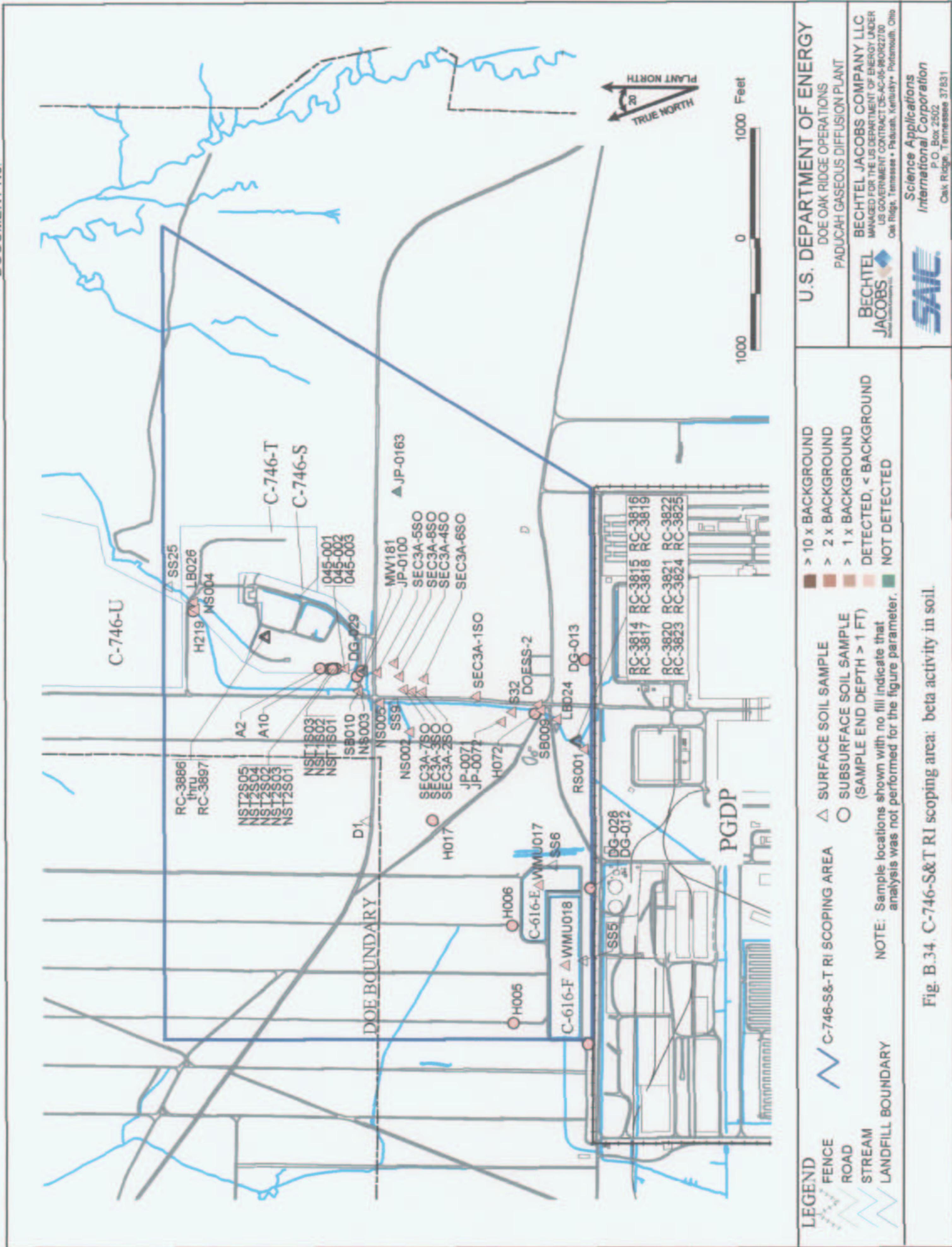
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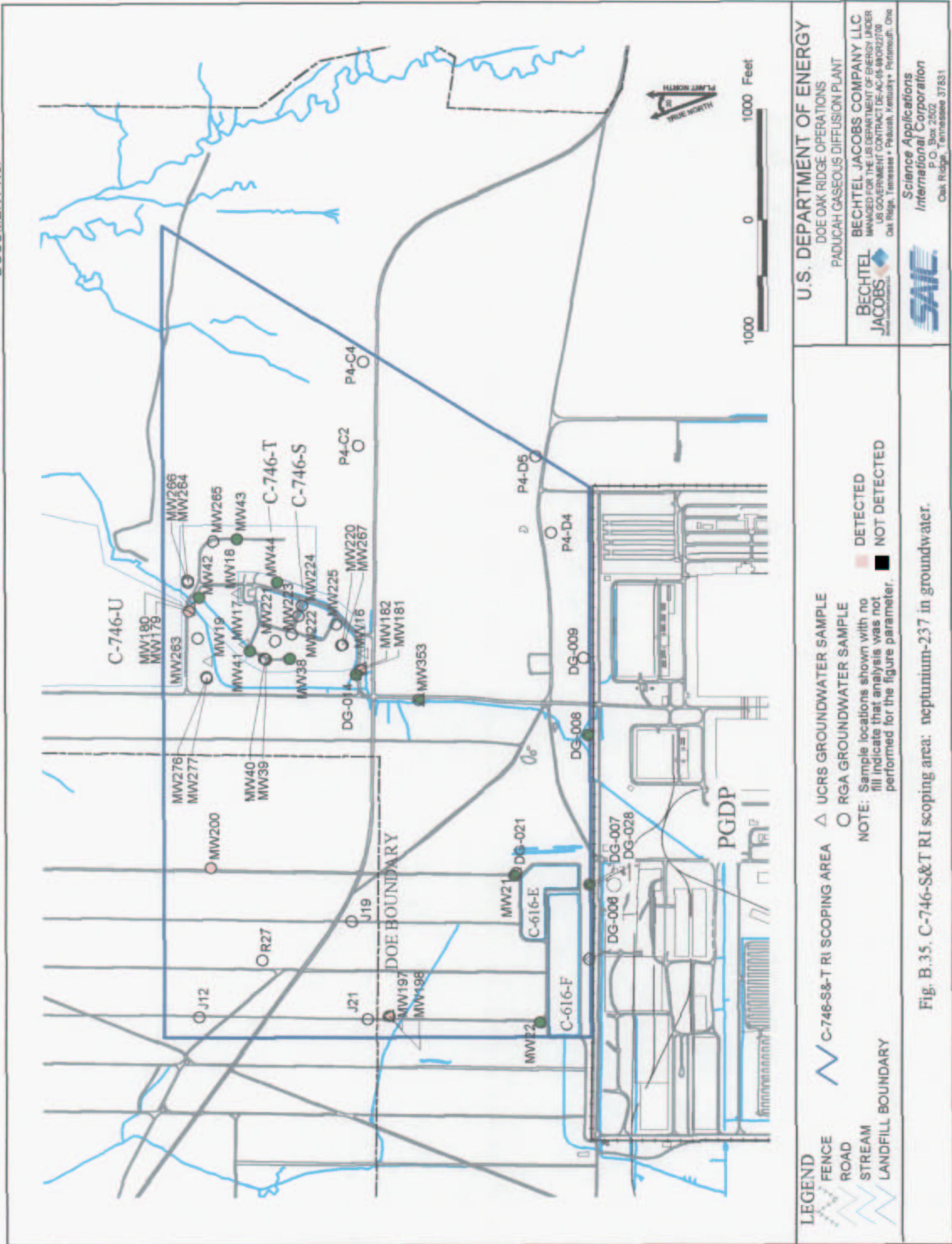
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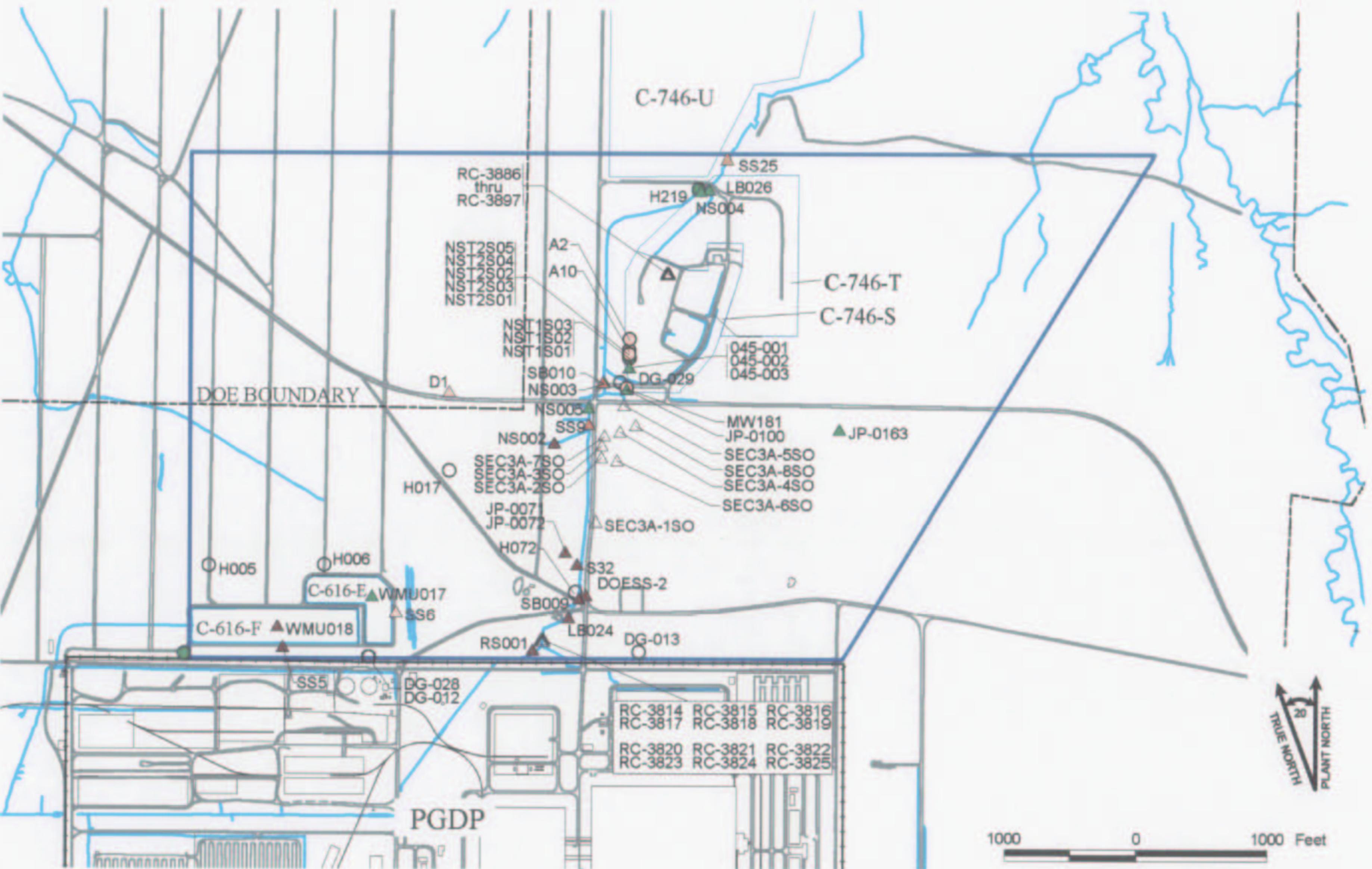
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Fig. B.33. C-746-S&T RI scoping area: beta activity in groundwater.







**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ SURFACE SOIL SAMPLE  
○ SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

■ > 10 x BACKGROUND  
■ > 2 x BACKGROUND  
■ > 1 x BACKGROUND  
■ DETECTED, < BACKGROUND  
■ NOT DETECTED

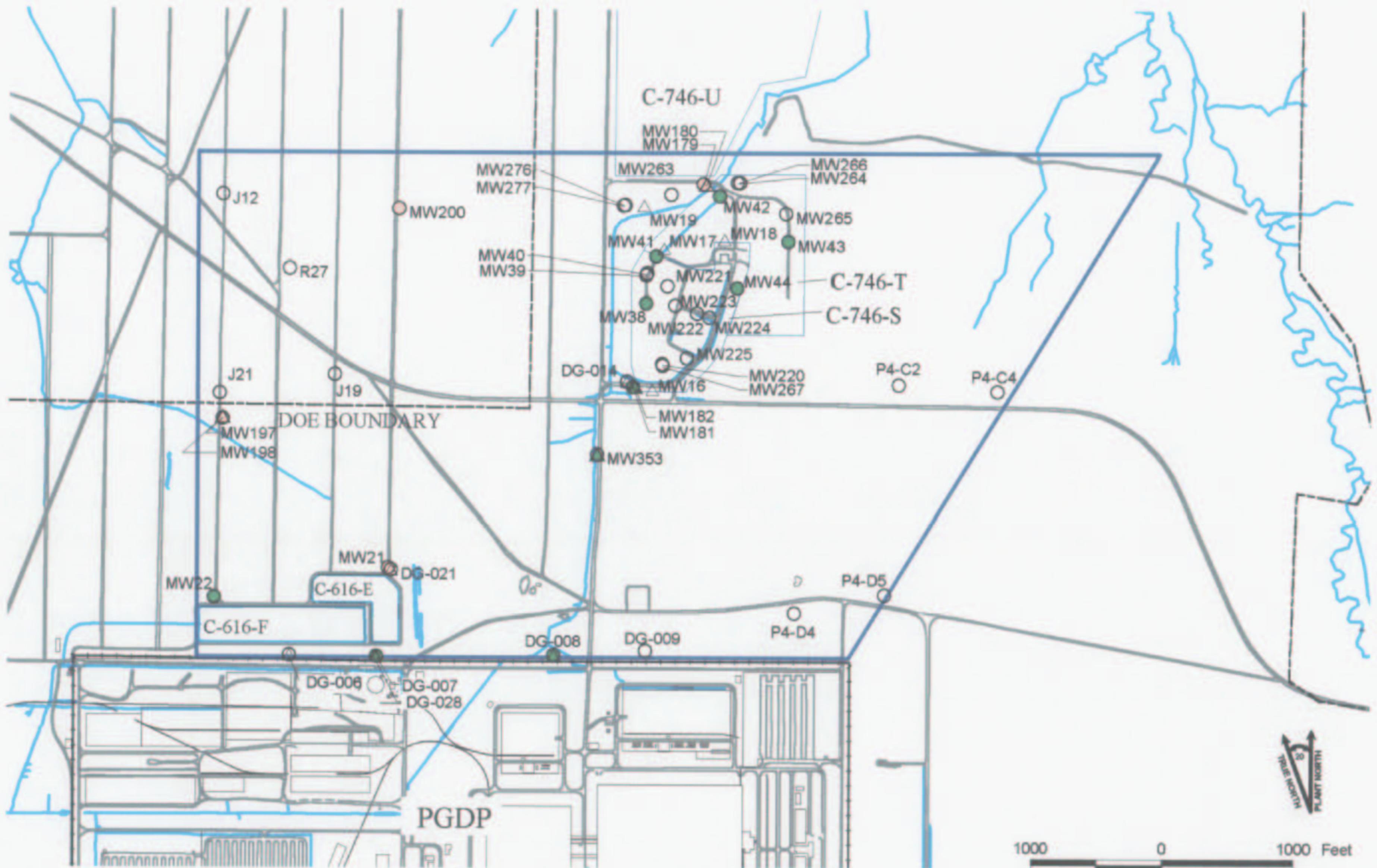
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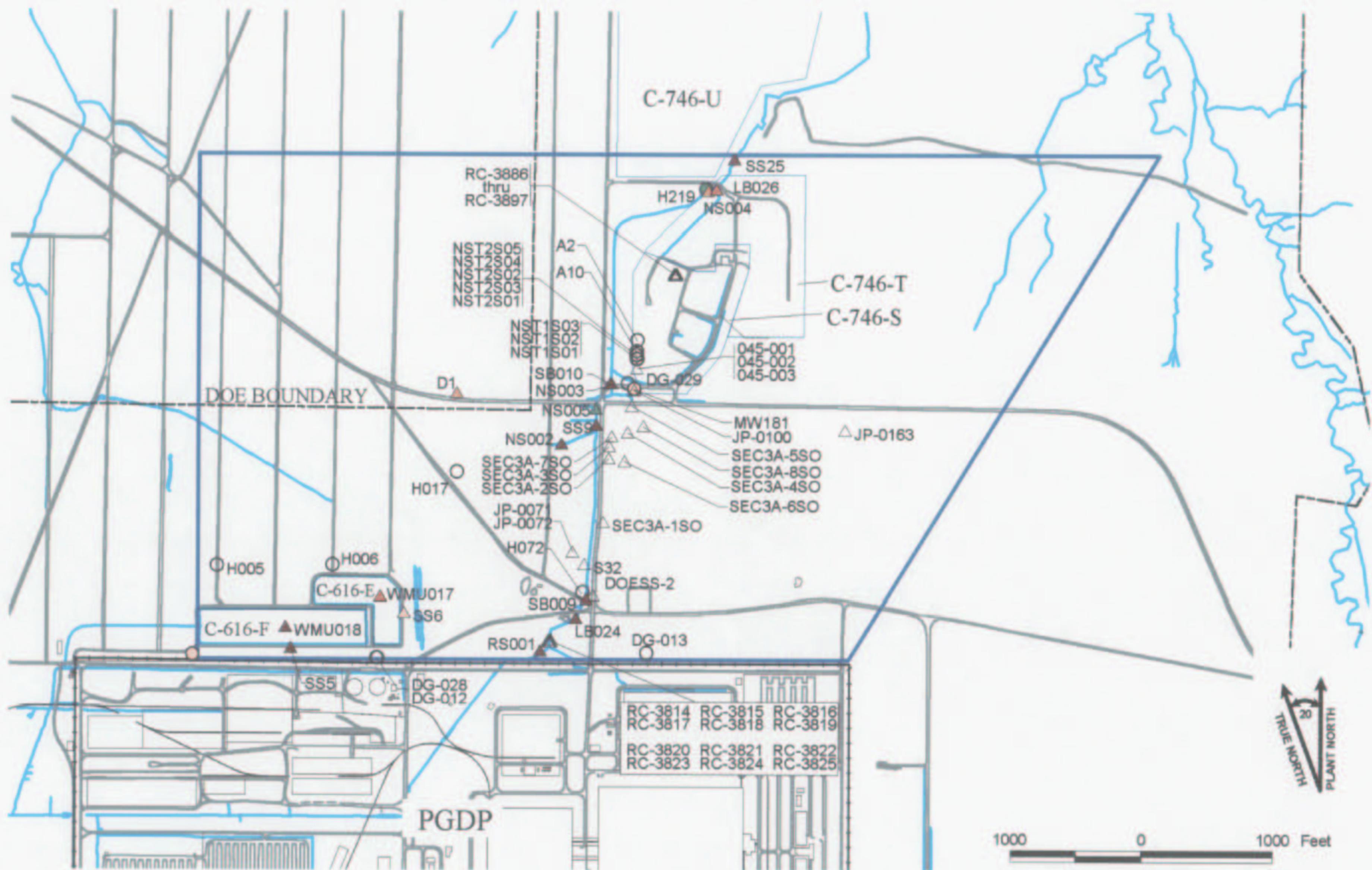


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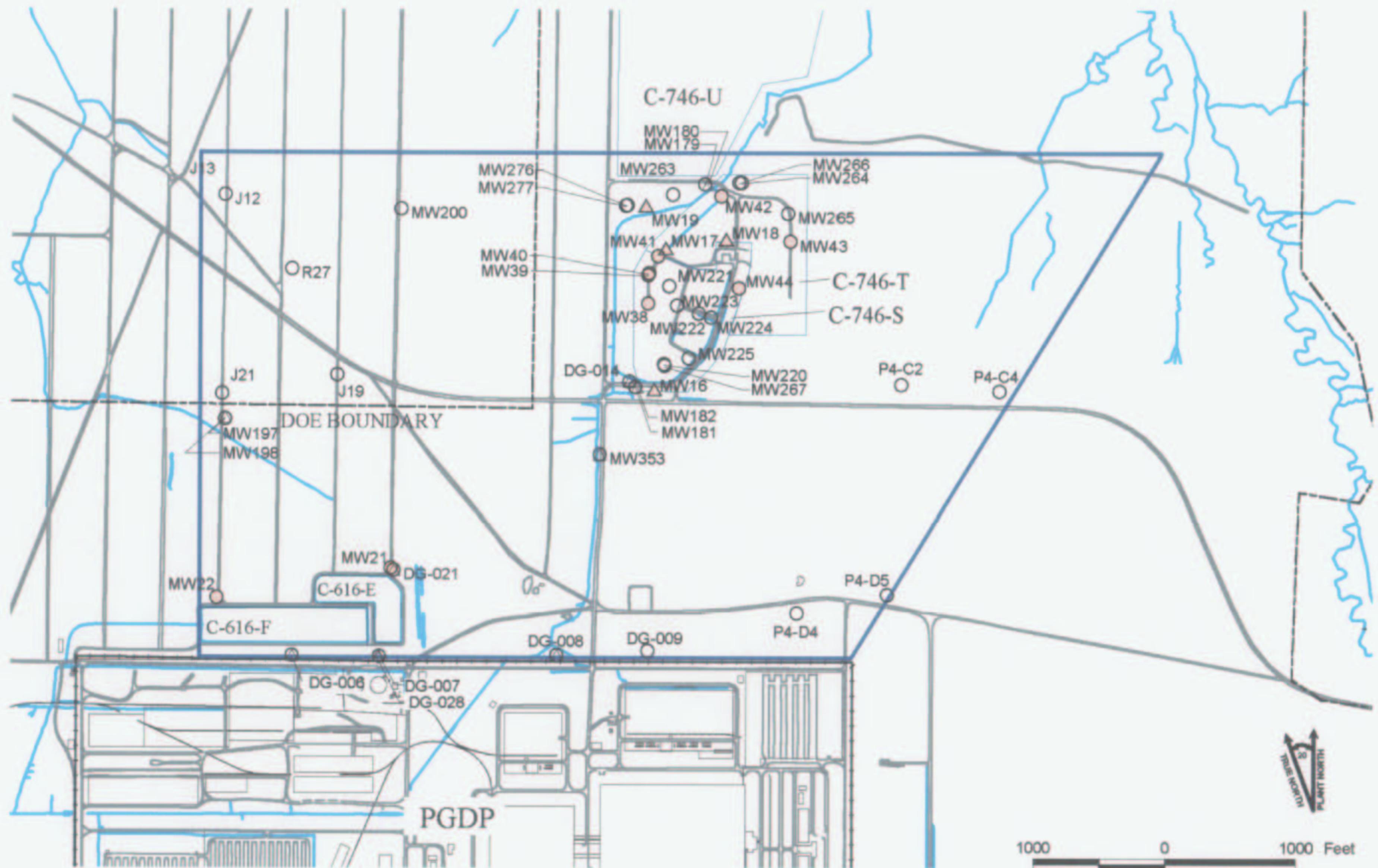
Fig. B.36. C-746-S&T RI scoping area: neptunium-237 in soil.



<b>LEGEND</b> FENCE ROAD STREAM LANDFILL BOUNDARY C-746-S&T RI SCOPING AREA UCRS GROUNDWATER SAMPLE RGA GROUNDWATER SAMPLE <p>NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.</p>	<b>U.S. DEPARTMENT OF ENERGY</b> DOE OAK RIDGE OPERATIONS PADUCAH GASEOUS DIFFUSION PLANT  <b>BECHTEL JACOBS COMPANY LLC</b> MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER US GOVERNMENT CONTRACT DE-AC-05-98OR22700 Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio
Fig. B.37. C-746-S&T RI scoping area: plutonium-239 in groundwater.	Science Applications International Corporation P.O. Box 2502 Oak Ridge, Tennessee 37831



<b>LEGEND</b> FENCE ROAD STREAM LANDFILL BOUNDARY	C-746-S&T RI SCOPING AREA	SURFACE SOIL SAMPLE SUBSURFACE SOIL SAMPLE (SAMPLE END DEPTH > 1 FT)	> 10 x BACKGROUND > 2 x BACKGROUND > 1 x BACKGROUND DETECTED, < BACKGROUND NOT DETECTED	<b>U.S. DEPARTMENT OF ENERGY</b> DOE OAK RIDGE OPERATIONS PADUCAH GASEOUS DIFFUSION PLANT		
				<b>BECHTEL JACOBS COMPANY LLC</b> MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER US GOVERNMENT CONTRACT DE-AC-05-88OR22700 Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio		
NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.				Science Applications International Corporation P.O. Box 2502 Oak Ridge, Tennessee 37831		
Fig. B.38. C-746-S&T RI scoping area: plutonium-239 in soil.			FIGURE No. c5ac90001sk063.apr DATE 08-12-01			



LEGEND

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE

○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

■ DETECTED  
■ NOT DETECTED

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PADUCAH GASEOUS DIFFUSION PLANT

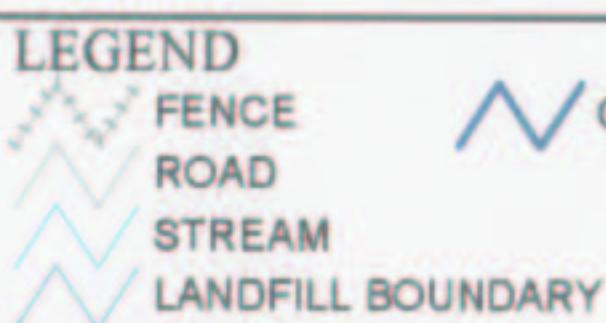
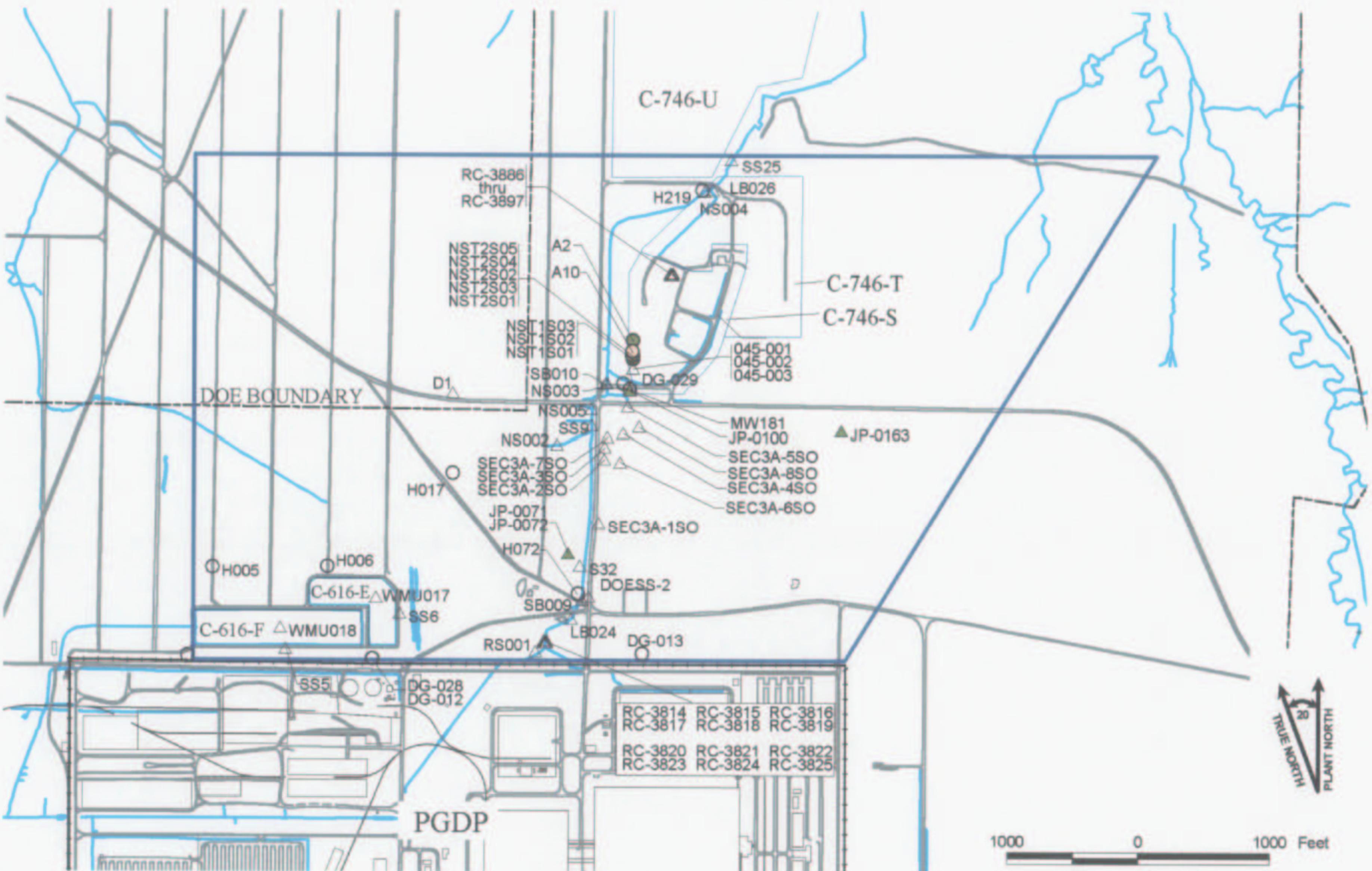
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Fig. B.39. C-746-S&T RI scoping area: radium-226 in groundwater.



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C-746-S&T RI SCOPING AREA

△ SURFACE SOIL SAMPLE  
○ SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

■ > 10 x BACKGROUND  
■ > 2 x BACKGROUND  
■ > 1 x BACKGROUND  
■ DETECTED, < BACKGROUND  
■ NOT DETECTED

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

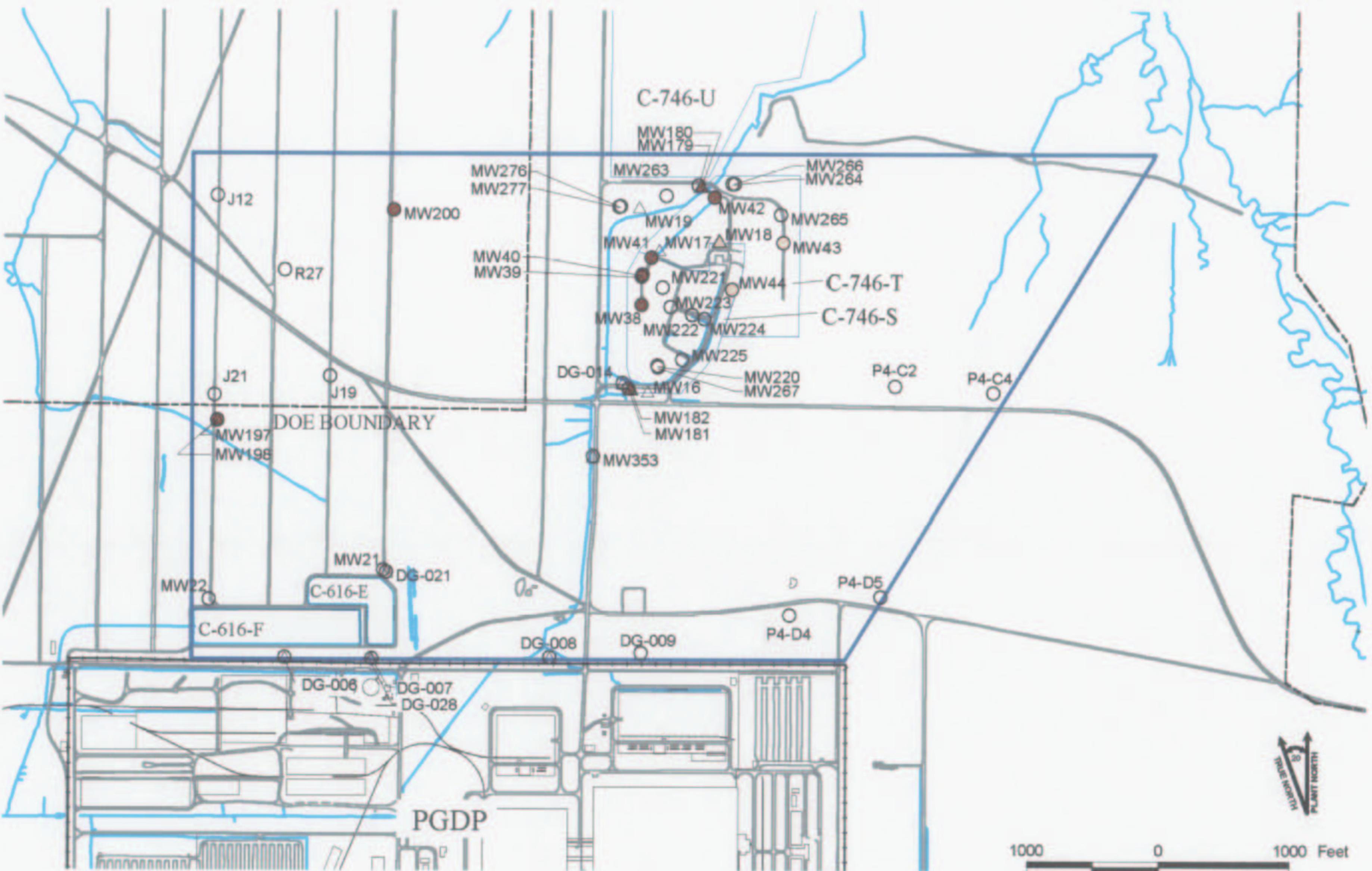
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Fig. B.40. C-746-S&T RI scoping area: radium-226 in soil.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE

○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED, > MCL  
> 10% FREQUENCY
- DETECTED, > MCL
- DETECTED, < MCL
- NOT DETECTED

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PADUCAH GASEOUS DIFFUSION PLANT

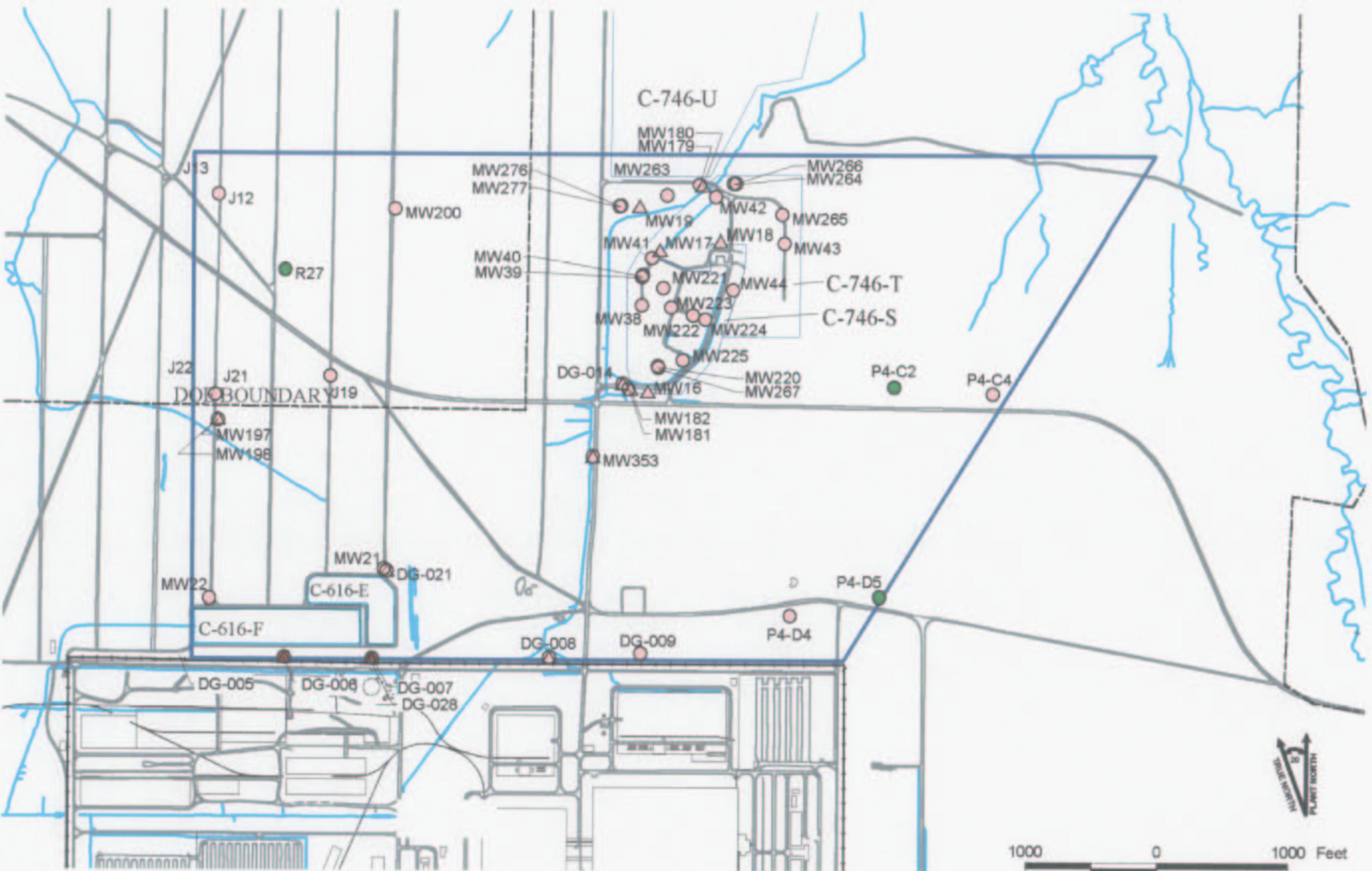
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Fig. B.41. C-746-S&T RI scoping area: radon-222 in groundwater.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE

○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

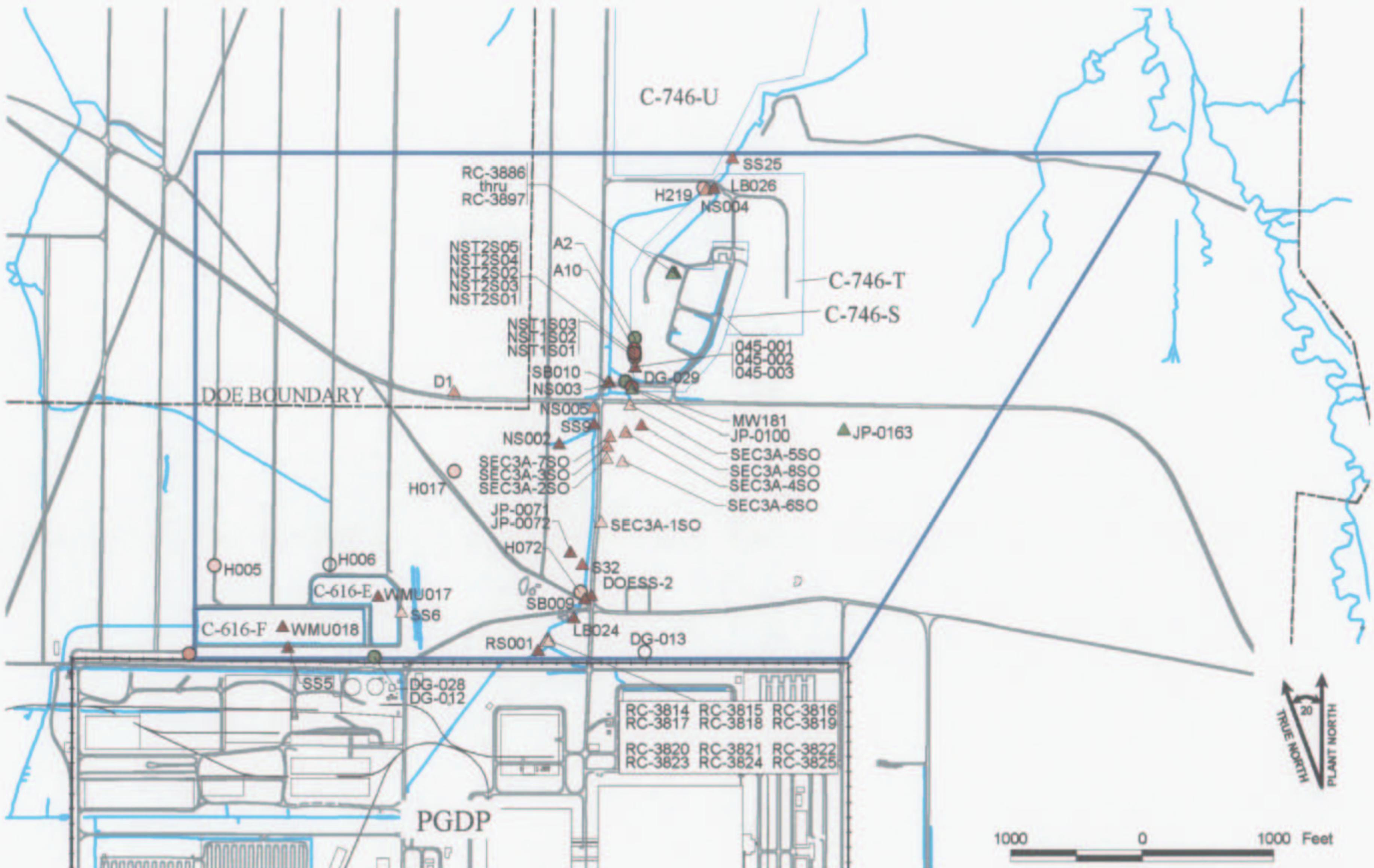
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- DETECTED, < MCL
- NOT DETECTED

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Fig. B.42. C-746-S&T RI scoping area: technetium-99 in groundwater.



**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ SURFACE SOIL SAMPLE

○ SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

■ > 10 x BACKGROUND  
● > 2 x BACKGROUND  
■ > 1 x BACKGROUND  
■ DETECTED, < BACKGROUND  
■ NOT DETECTED

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

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PADUCAH GASEOUS DIFFUSION PLANT

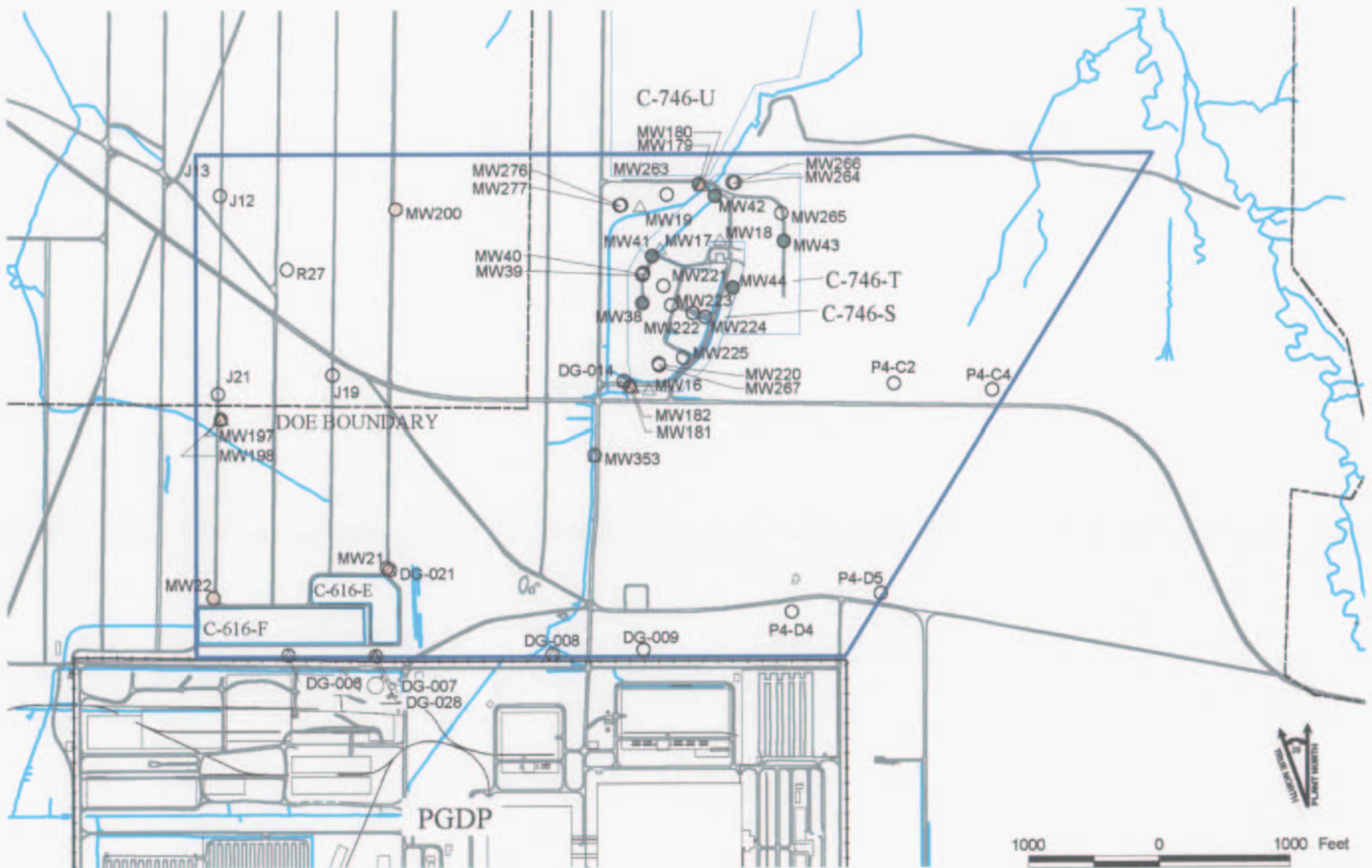
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Fig. B.43. C-746-S&T RI scoping area: technetium-99 in soil.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

UCRS GROUNDWATER SAMPLE

RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- |              |
|--------------|
| DETECTED     |
| NOT DETECTED |

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PADUCAH GASEOUS DIFFUSION PLANT

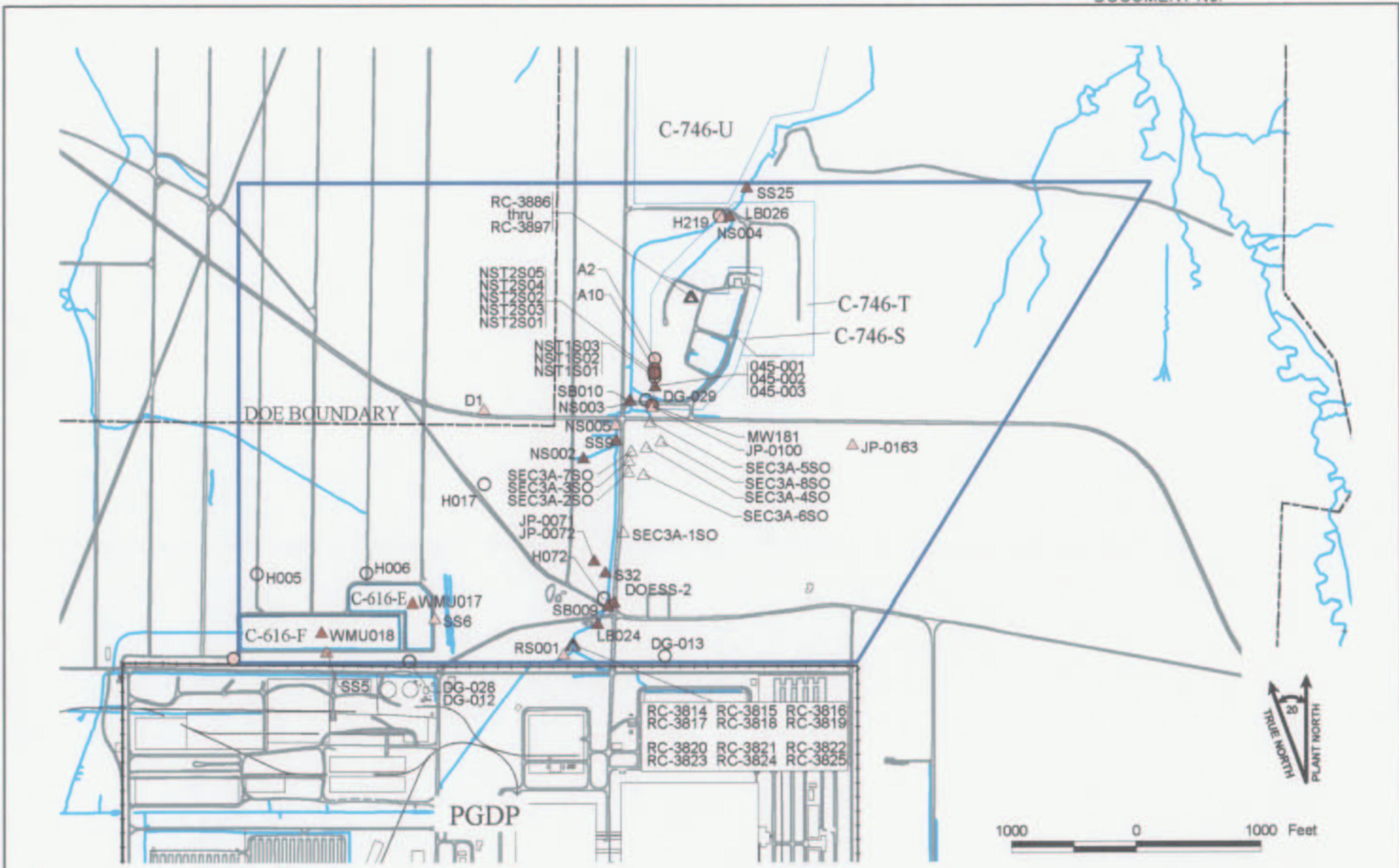
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Fig. B.44. C-746-S&T RI scoping area: thorium-230 in groundwater.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ SURFACE SOIL SAMPLE

○ SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

■ > 10 x BACKGROUND  
■ > 2 x BACKGROUND  
■ > 1 x BACKGROUND  
■ DETECTED, < BACKGROUND  
■ NOT DETECTED

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

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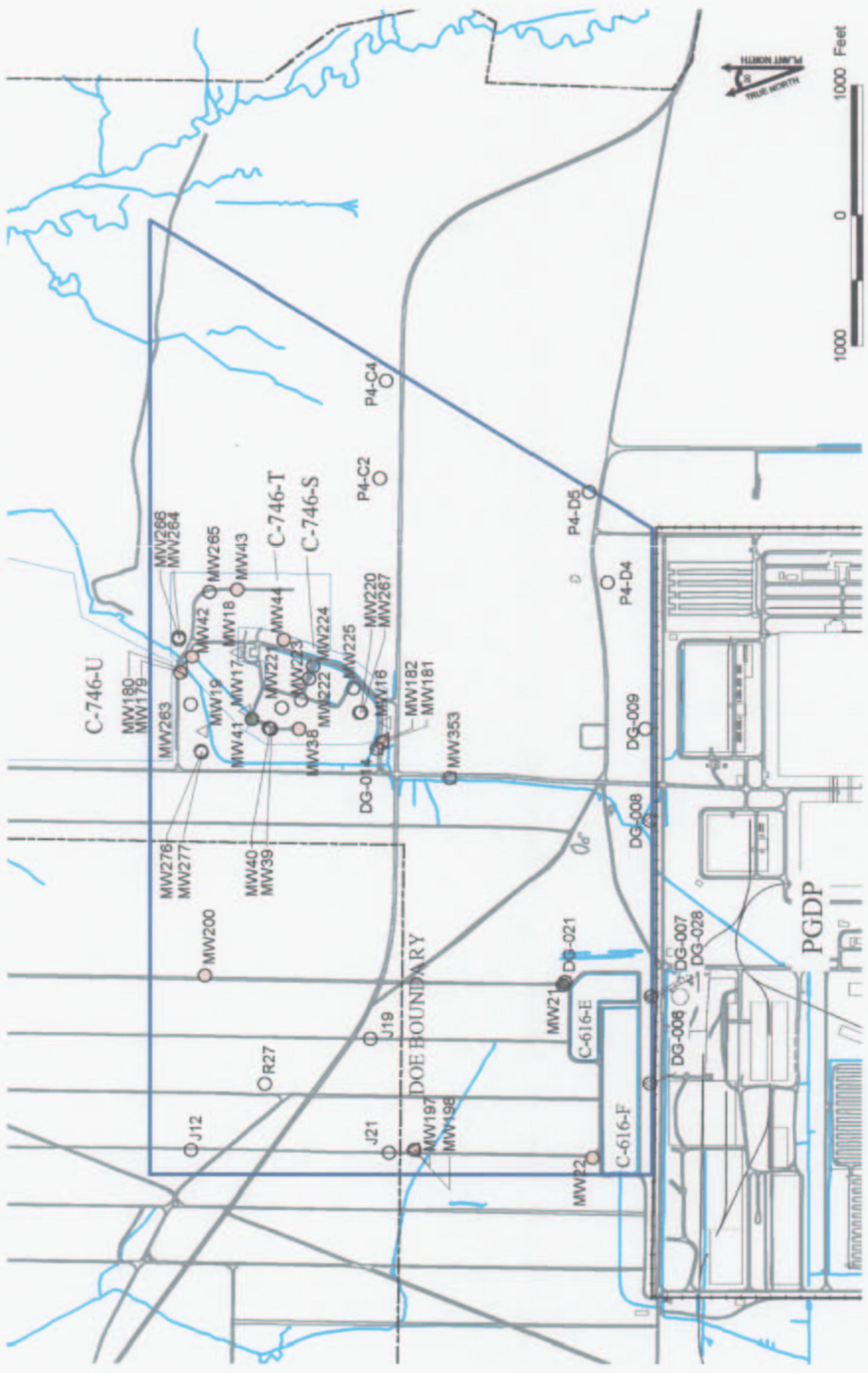
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Fig. B.45. C-746-S&T RI scoping area: thorium-230 in soil.

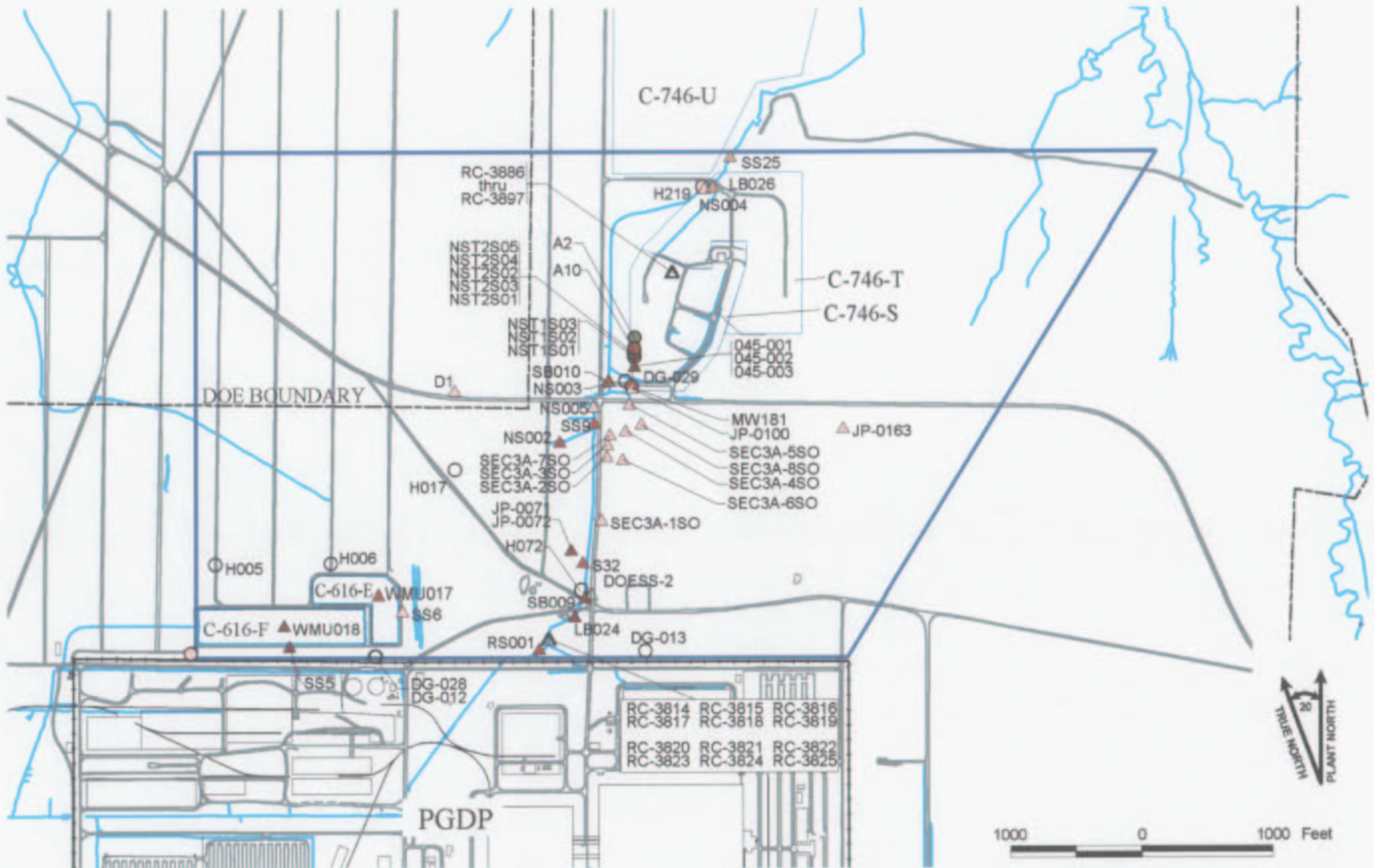


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<b>Science Applications International Corporation</b> P.O. Box 2802 Oak Ridge, Tennessee 37831	
<b>DATE</b> FIGURE No. c5ac90001sk079.apr 08-12-01	

Fig. B.46. C-746-S&T RI scoping area: uranium-234 in groundwater.

**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

SURFACE SOIL SAMPLE

SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

■ > 10 x BACKGROUND

■ > 2 x BACKGROUND

■ > 1 x BACKGROUND

■ DETECTED, < BACKGROUND

■ NOT DETECTED

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

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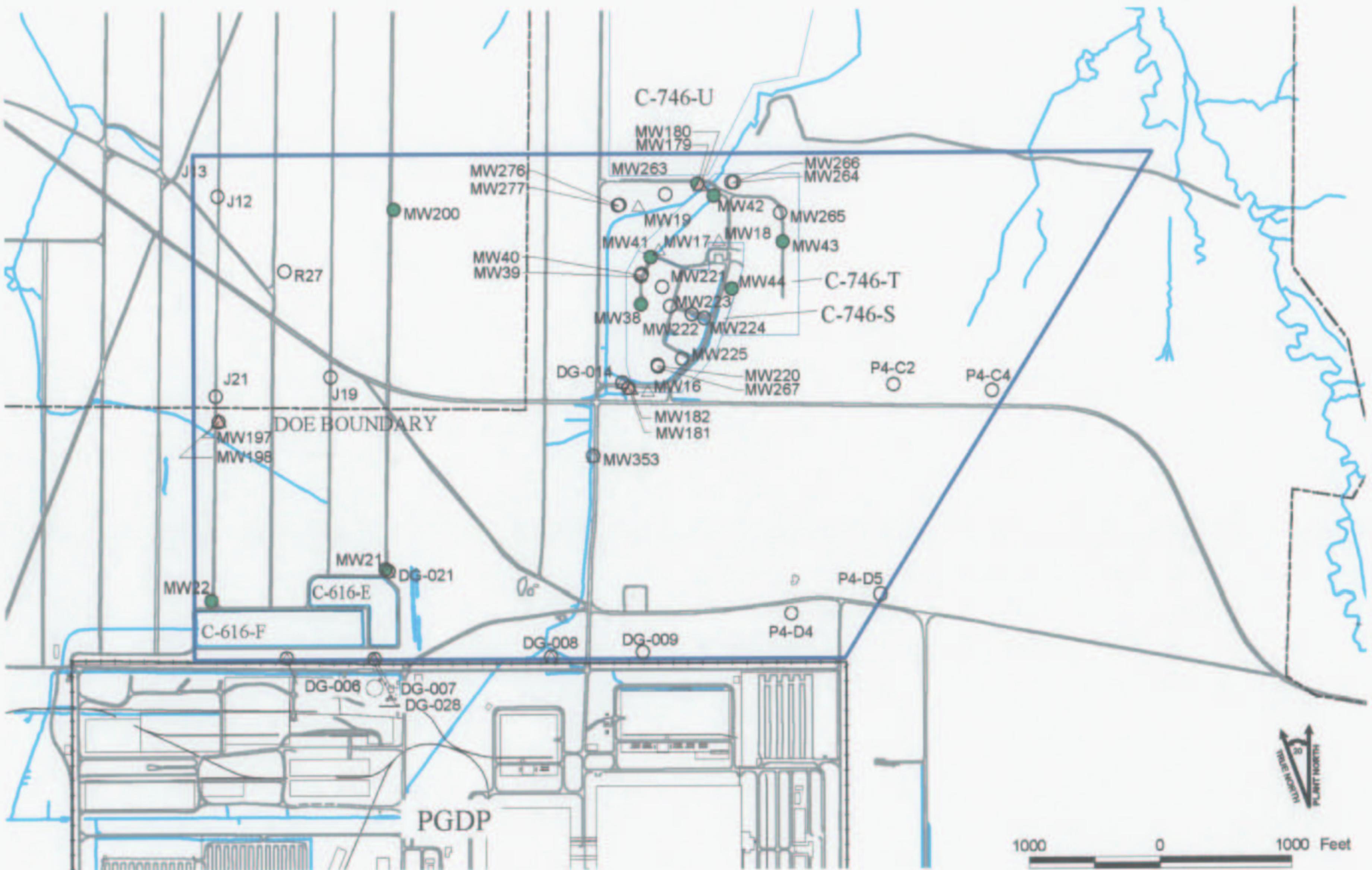
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Fig. B.47. C-746-S&T RI scoping area: uranium-234 in soil.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

UCRS GROUNDWATER SAMPLE

RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

- DETECTED
- NOT DETECTED

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PADUCAH GASEOUS DIFFUSION PLANT

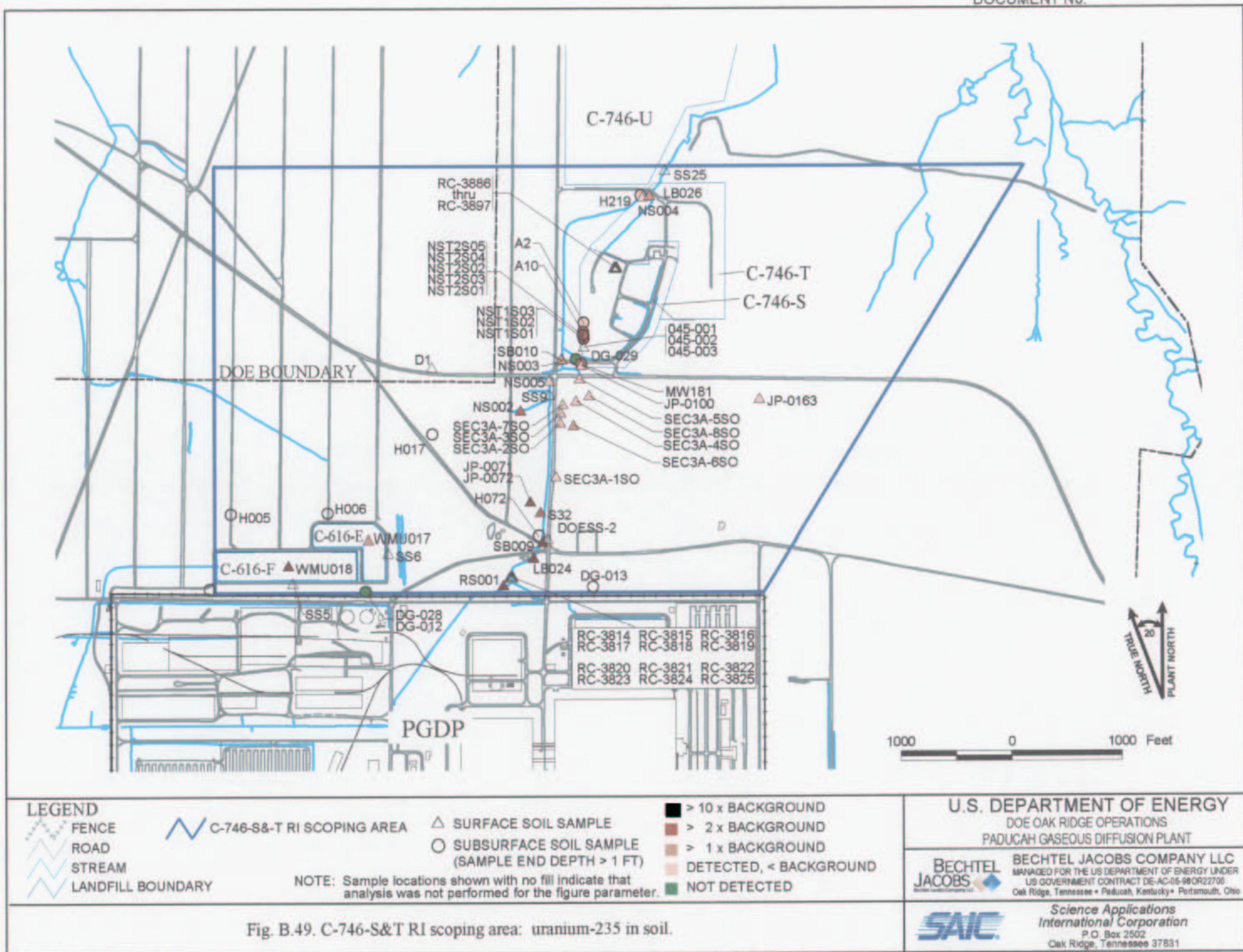
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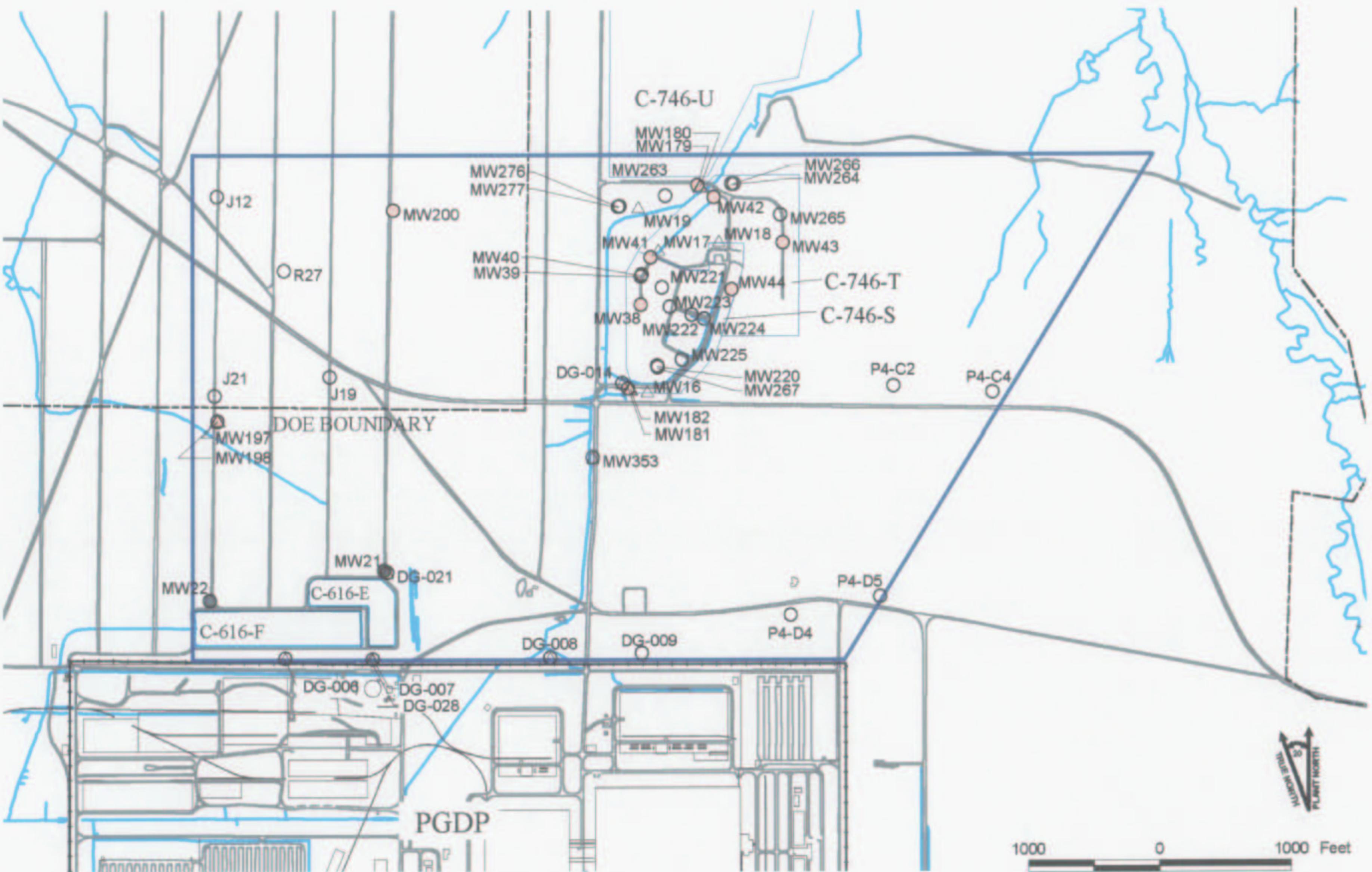
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Fig. B.48. C-746-S&T RI scoping area: uranium-235 in groundwater.



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## LEGEND

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&amp;T RI SCOPING AREA

△ UCRS GROUNDWATER SAMPLE

○ RGA GROUNDWATER SAMPLE

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

■ DETECTED

■ NOT DETECTED

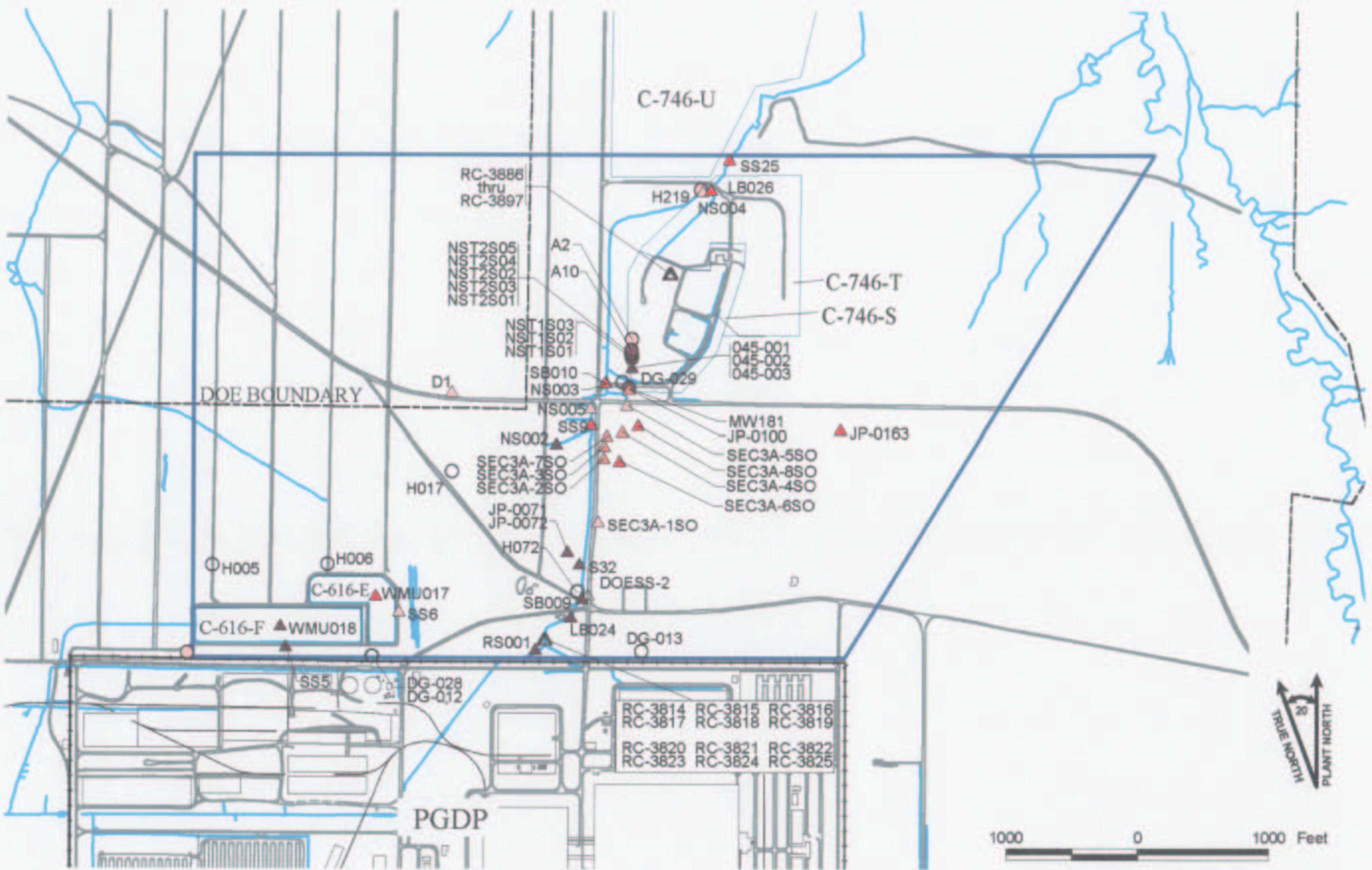
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Fig. B.50. C-746-S&amp;T RI scoping area: uranium-238 in groundwater.



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**LEGEND**

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

△ SURFACE SOIL SAMPLE  
○ SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

■ > 10 x BACKGROUND  
■ > 2 x BACKGROUND  
■ > 1 x BACKGROUND  
■ DETECTED, < BACKGROUND  
■ NOT DETECTED

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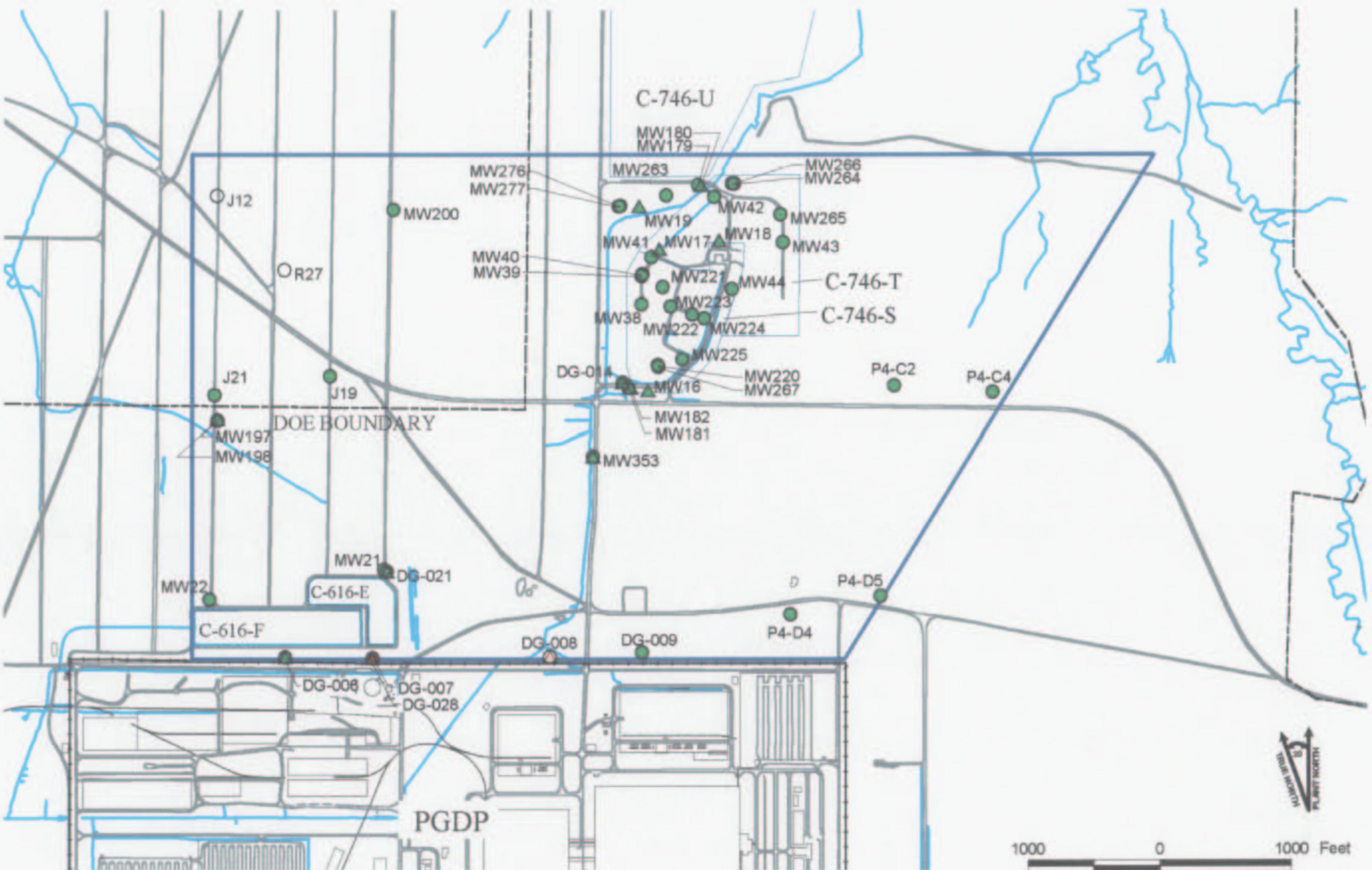
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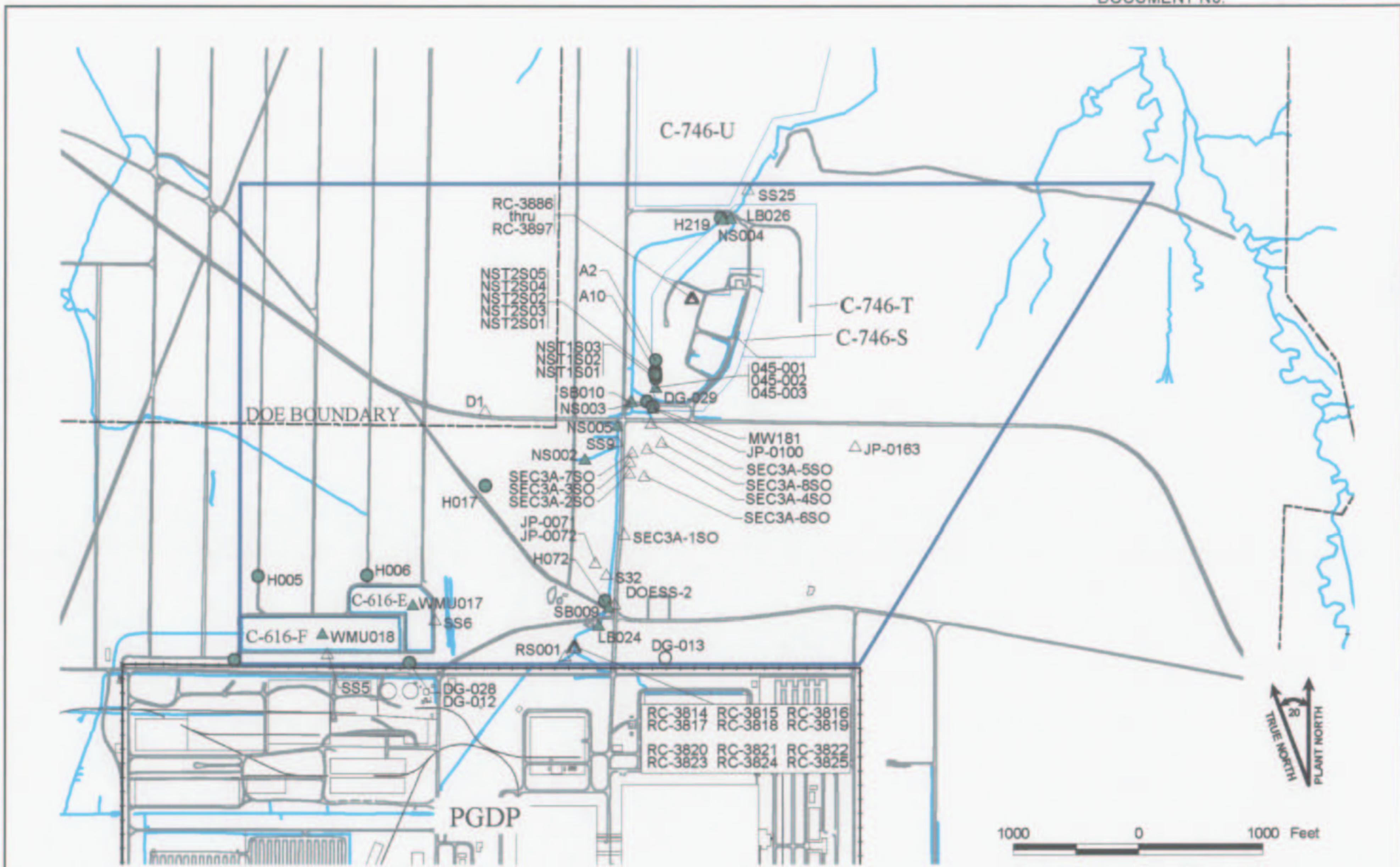
Fig. B.51. C-746-S&T RI scoping area: uranium-238 in soil.



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<b>LEGEND</b> FENCE ROAD STREAM LANDFILL BOUNDARY C-746-S&T RI SCOPING AREA UCRS GROUNDWATER SAMPLE RGA GROUNDWATER SAMPLE <p>NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.</p>	DETECTED, > MCL > 10% FREQUENCY DETECTED, > MCL DETECTED, < MCL NOT DETECTED	<b>U.S. DEPARTMENT OF ENERGY</b> DOE OAK RIDGE OPERATIONS PADUCAH GASEOUS DIFFUSION PLANT
		<b>BECHTEL JACOBS COMPANY LLC</b> <small>Managed for the US Department of Energy under US Government Contract DE-AC-05-88OR2700</small> <small>Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio</small>
Fig. B.52. C-746-S&T RI scoping area: 1,1-dichloroethene in groundwater.		<i>Science Applications International Corporation</i> <small>P.O. Box 2502</small> <small>Oak Ridge, Tennessee 37831</small>



## LEGEND

- FENCE
- ROAD
- STREAM
- LANDFILL BOUNDARY

C-746-S&T RI SCOPING AREA

SURFACE SOIL SAMPLE

SUBSURFACE SOIL SAMPLE  
(SAMPLE END DEPTH > 1 FT)

DETECTED

NOT DETECTED

NOTE: Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

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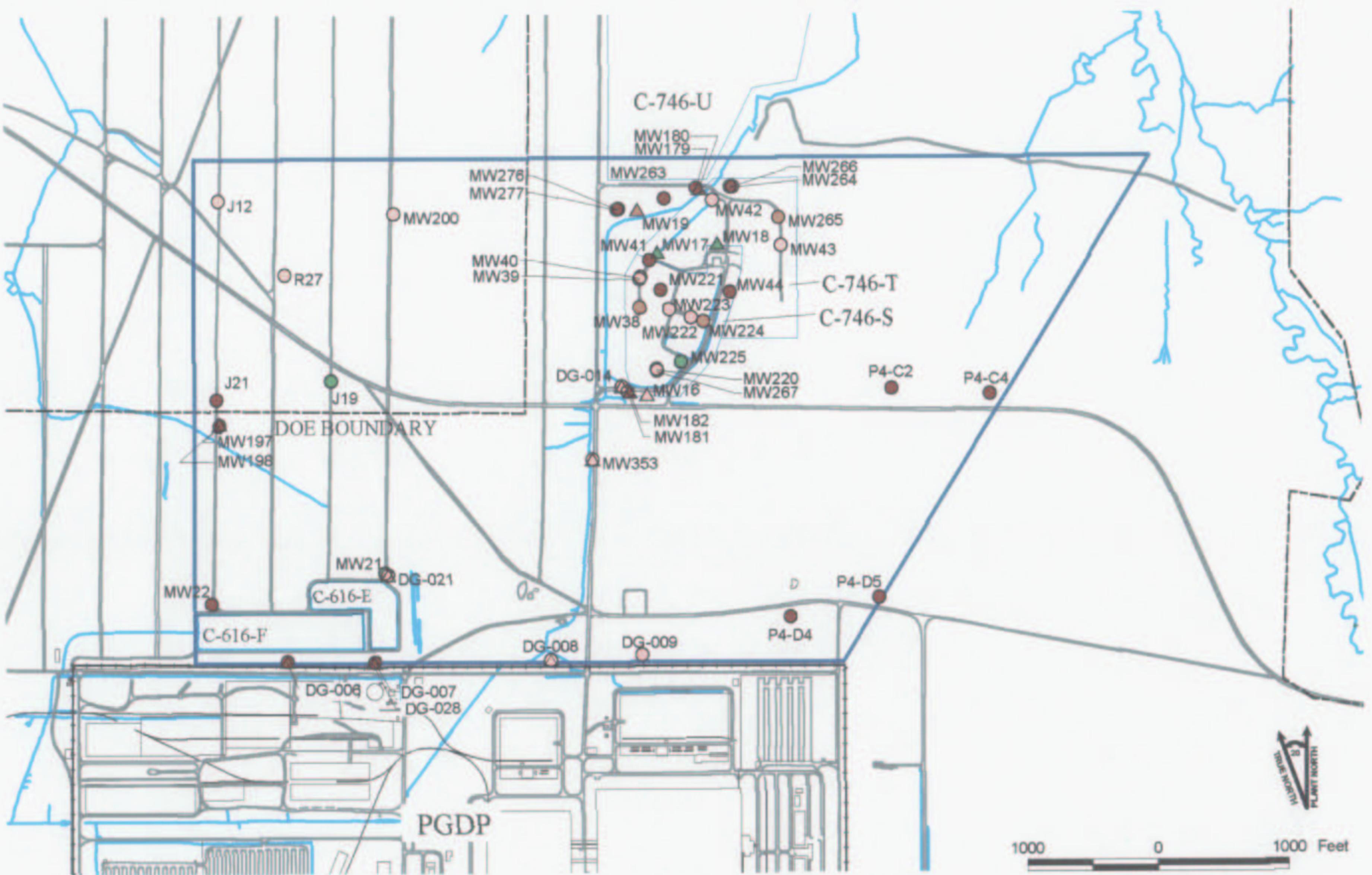
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Fig. B.53. C-746-S&T RI scoping area: 1,1-dichloroethene in soil.



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## LEGEND

FENCE

ROAD

STREAM  
LANDFILL BOUNDARY

## C-746-S-&-T RI SCOPING AREA

## △ UCRS GROUNDWATER SAMPLE

RGA GROUNDWATER SAMPLE

**NOTE:** Sample locations shown with no fill indicate that analysis was not performed for the figure parameter.

■ DETECTED, > MCL

> 10% FREQUENCY  
DETECTED > MCI

■ DETECTED, > MCL

DETECTED, < M

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**JACOBS**

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MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER  
US GOVERNMENT CONTRACT DE-AC-05-98OR22700  
Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio

Fig. B.54. C-746-S&T RI scoping area: trichloroethene in groundwater.



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